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The Next Improvement in Steel Making

"Killing" in Molds Advocated, with
Some Observations on the Exaggerated
Emphasis Long Put Upon Chemical Purity

BY GEORGE AUCHY

Mold-killed steel is in a sense the final improvement in steel making—the logical and inevitable culmination of all improvements; that is to say, no improvements in steel making, chemical or mechanical, with mold killing left out will make a steel as good as steel can be made. By mold killing the writer means holding the steel quietly fluid for a time in the molds (basic lined) by the heat of electric arcs in the covers the molds are provided with.

It is very generally agreed that the superiority of crucible steel is due to the killing. Impurities, solid and gaseous, have a chance to escape that is lacking in the Bessemer and open-hearth processes.

Killing in Crucibles Has Shortcomings

But although killing in crucibles is far better than not killing at all, it yet falls considerably short of what it might be. For the good effect of the killing is to a certain extent undone by the teeming into the molds afterwards. The separated slag and oxide are to a certain extent mixed up again with the steel. Fresh slag and oxide are to a certain extent formed by the exposure to the air in teeming. Air is to a certain extent carried along in by the falling stream. Fresh volumes of gases are to a certain extent evolved at the lower temperatures just before solidification.

Moreover the rapid chilling causes a segregation of chemical impurities all around the ingot about one-fourth the distance to the center; traps a pocket of segregated impurities in the middle upper half of the ingot that would in all probability have risen clear to the top, given time enough; and last, but not least, causes a pipe to form that could not have formed had the solidification been gradual, and that of the top last of all.

Obviously the crucible is not the place to do the killing. Obviously the mold is the place to do the killing. But obviously again, if this is done there is no further occasion for the use of crucibles, and they can peacefully pass out of practice, and the steel be made economically in large masses Bessemer or open hearth way, and the mold-killed product excel in quality present day crucible killed steel.

Chemical Purity Persistently Sought

However this may be, it is absolutely certain that the steel must be mold killed to be the best possible steel. This would seem plain. Then why has the steel maker been slow to see that mold killing has been for some time a practical proposition? From the view that it is as a matter of fact not a practical proposition, and exists only in the lively imagination of the writer, that individual would stoutly dissent. He would attribute the indifference of the steel maker heretofore to this improvement to the fact that although the latter has always clearly recognized the importance of sound clean ingots, he has considered chemical purity as of vastly more importance still, and it has therefore been along this latter line that his efforts have been concentrated. This was natural and indeed inevitable. Output and not quality has been so far the steel maker's main aim (although not his only one—for

he has been anxious for quality also), and he is therefore strongly disposed to favor a recipe for making steel good that does not interfere with that aim, and to put off until the last moment the consideration of one that does so interfere. This being the case, it was inevitable that when the chemical engineer years back gave him the assurance that although there was something in making steel carefully, and although there was something in treating it right, yet getting it strictly "C P," or as near to that as possible, was the main thing to insure good quality, he should jump at it joyously and assimilate it eagerly. And so he has resolutely and ruthlessly been chasing the last hundredth of phosphorus out of his steel, and at the same time has pushed his output with undiminished ardor and success.

Chemical Composition an Exaggerated Factor

But the ultimate result has not been entirely satisfying. The chemically pure and mechanically impure steel has turned out to be on the whole no better than it should be, and at times fatally and disastrously disappointing, and the steel maker is being forced to a realization of the distasteful truth he has so long pushed to the background. That truth is that although within wide limits chemical composition is everything, and both soundness and heat treatment as nothing, in determining the properties and the quality of steel, yet within comparatively narrow limits (really pretty wide) the reverse of this holds good, and it is chemical composition that is as nothing, and soundness and heat treatment everything. Taking a piece of tank steel, a piece of tool steel, and a piece of high speed tool steel, we see at once that the enormous difference in the properties of these three steels is due entirely to differences in chemical composition. No degree of mechanical purity and no amount of heat treatment will make a tool out of the first or a red-hard tool out of the second, and the chemical engineer's proposition obviously has a solid foundation of indisputable truth to rest upon. But now to go further, and compare high speed steels with high speed steels and carbon tool steels with carbon tool steels, for the chemical engineer to impute the great differences in quality that occur in practice to small differences in chemical composition is to go too far. It is working nature's laws to death. It is seeking a significance where there is no significance.

Same Analysis but Different Physical Properties

Where is the proof of this last assertion that within comparatively narrow limits chemical composition is of no importance? The proof is ample and convincing. It is to be found in the experiments of Taylor and in the experiments of every investigator. The same chemical composition gives widely different results, and widely different chemical compositions give the same results. The proof is, moreover, to be found in the daily experience of every practical steel man. He sees good steels chemically give poor results in service, and poor steels chemically give good results in service. A steel goes wrong. An analysis is promptly made. Almost invariably the com-

ment is, "Well, the analysis is all right." Again, a steel rail that has stood 35 years of service is taken up to see what a good rail analyzes. It analyzes bad, and would have been rejected under modern chemical specifications. Yet it stood, while the modern rail, meeting every specification promptly, "lies down and quits." It would really seem as though a possible way of making modern rail specifications of some value practically would be to reject the rails that meet the chemical specifications and accept those that do not.

In short, all experiment and all experience go to show that the pleasing theory of the chemical engineers—the theory that if a steel be pure chemically, nothing else matters much—is not true. Not only that, but it is perhaps the exact reverse of the truth. Just as in the paint trade it is developing that the purer a paint the poorer, so in the iron trade is sentiment veering with regard to the chemically combined and alloyed impurities in steel. Elements that like copper were formerly carefully kept out are now frequently carefully put in, and elements like silicon that a few years ago could not be got low enough, now cannot be got high enough to suit many. It might not be a wild guess that in the near future phosphorous will be specified for instead of against, and sulphur accepted with equanimity and allowed to shift for itself. In mold-killed steel it would probably find its way, although leisurely, to the slag as sulphide of manganese. And the superiority of alloy steels is beyond question.

Output the Compelling Motive

The fact is that the chemical engineer's extreme theory would long since have been abandoned had it not been for some powerful motive to the contrary. That motive in a word is output, and is a motive potent enough to cause the steel maker to stick to the theory to the last ditch.

But it would seem that the last ditch has at length been reached. The steel maker can no longer compel himself to ignore obviously and constantly recurring facts, and can no longer put off the consideration of true theories. Not so triumphantly does he still wave his chemist's report aloft as a guarantee of quality, and more and more every

day we hear of "slag inclosures," "occluded gases," "pipes," "blow holes," "segregations" and "discards." Said *The Iron Age* in an editorial recently (October 17, 1912): "Increasing emphasis has been put of late in the voluminous discussions on rail steel on the imperative necessity of finding a way to prevent the unsoundness which enters into steel in the very process of casting and solidification into its original form."

With the iron trade thus in earnest and on the right scent at last, it will not take long for a general realization of the fact that the one sure, scientific and only way of making sound, clean, reliable steel is to kill the steel in the molds by overhead electric heat, solidifying the top of the ingot last; provided, of course, there are no lurking and insuperable mechanical difficulties, and that the cost is not too great. With regard to the first point, the writer for his part can see no probability of great trouble. With regard to the second point it would seem plain that if it does not cost too much to refine open hearth steel in an electric auxiliary furnace, it would cost considerably less to kill it electrically in the molds instead of thus refining it further in an auxiliary electric furnace. Here the point must be raised that if the writer's idea of the utter inutility of extreme chemical purity be correct, then the trade in using electricity to refine steel to a greater degree than it can be refined in the ordinary open hearth furnace is entirely on the wrong track, any gain in quality thereby to the contrary notwithstanding. For such gain would seem to be due to less impurity mechanically held rather than to less impurity chemically combined, and this consummation can of course be far better reached by killing in the molds, omitting the supererogatory (and it might be added superstitious) step of refining in the electric auxiliary furnace. Clearly, the chemical engineers are half right, and just as clearly they are half wrong. Within very wide limits of chemical composition it is true the analysis tells everything. But within narrow limits it tells nothing—there is nothing to tell—and all metallurgical efforts based on the reverse of this latter proposition can accomplish nothing except the familiar achievement of good money resolved into its original elements.

The Non-Metallic Impurities Found in Steel

Character and Sources of Slag Inclusions —They Are More Often Deoxidation Products than Traceable to Refractories

The importance of the non-metallic impurities in steel is attracting much attention among the German steel makers, and the Chemical Committee of the Verein deutscher Eisenhüttenleute has held two meetings at which this subject was considered. The papers presented, together with the discussions, are published in *Stahl und Eisen* for September 19 and October 3. At the first meeting the papers took up the "Determination of Slag Inclusions in Steel." The first paper considered this from the metallographic standpoint and was by G. Mars of Dueseldorf-Rath. He first pointed out the importance of determining the origin of the non-metallic inclusions, so that the steel maker might know what methods to experiment with to prevent their presence. The many possible sources of these inclusions are briefly pointed out, and a short survey made of the previous work done on the subject. The conclusions drawn from the literature reviewed are that the non-metallic impurities, of whatever kind, affect the properties of the steel harmfully. They weaken the metal by being themselves weak and by displacing the ordinary constituents of the steel; also by serving as little notches cut in the steel from which fracture can start.

For these reasons modern methods of making high grade steels emphasize the importance of holding the liquid steel quiet and allowing the impurities to separate. The electric furnace methods are especially praised on this account, but the literature of the subject contains very little or only general information regarding the kind, amount and distribution of non-metallic inclusions in steels made by the different processes, or in the material at different stages of these processes.

An account is then given of a microscopical examination of a series of specimens submitted by the association, and is accompanied by 24 excellent photomicrographs. These specimens consist of material made in different ways, and taken at various stages of the processes. The analyses of some of them are given below:

TABLE 1.

Material.	C. Per cent.	S. Per cent.	P. Per cent.	Mn. Per cent.	Si. Per cent.	Ni. Per cent.
Basic Bessemer No. 1 before ferromanganese	0.06	0.063	0.061	0.19	Tr.	...
The same after pouring the last ingot	0.09	0.062	0.083	0.39	"	...
Basic Bessemer No. 2 before ferromanganese	0.04	0.063	0.057	0.19	"	...
The same after pouring the last ingot	0.05	0.065	0.081	N.D.	"	...
Basic open hearth No. 1 taken after the boil	0.42	0.062	0.151	0.32	"	...
The same after pouring the last ingot	0.11	0.060	0.044	0.42	"	...
Basic open hearth No. 2, final test	0.30	0.020	0.026	0.90	0.24	4.77
Electric soft steel after the first slag	0.06	0.054	0.004	0.20	Tr.	...
The same, final test	0.12	0.035	0.011	0.42	0.07	...
The same, after pouring the last ingot	0.10	0.038	0.012	0.42	0.07	...
Acid open hearth No. 1	0.36	N.D.	N.D.	0.91	0.31	2.24
Acid open hearth No. 2	0.56	0.037	0.045	0.84	0.14	...
Acid open hearth No. 3	0.33	N.D.	N.D.	0.57	0.23	2.06
Crucible No. 1	0.36	"	"	1.05	0.25	3.70
Crucible No. 2	0.49	"	"	1.28	0.23	...

The tests were cast in small iron molds and weighed about 6½ lb. They were examined either in this condition or after being forged down to half the original cross section. The basic Bessemer tests examined were the blown metal in the cast and forged condition, the finished steel

as cast taken after pouring the first ingot, and as forged after pouring the third ingot. Altogether four heats were tested. Before the addition of ferromanganese, the metal proved to be full of non-metallic inclusions. At least two distinct kinds can be distinguished, one black and the other clearer in color. The first is sometimes found in the latter, and sometimes the latter in a crystallized condition is included in the black material. Both of these conditions are illustrated by photomicrographs in the original paper.

Similarly appearing inclusions are found in the steel after the addition of the ferromanganese. They are distributed uniformly through the steel, which is to be expected, considering the small size of the test ingots. The amount of the inclusions varies. There are more in the steel before than after deoxidation, and the amount decreases to the last sample, which was taken after pouring the last ingot.

Character of the Inclusions

Very little data can be given as to the nature of the inclusions. It is to be expected, however, that oxides predominate in the metal before the addition of ferromanganese, and deoxidation products and sulphides in the metal afterwards. The basic open-hearth test includes samples taken after the boil, at the end of the heat before adding ferromanganese, after adding ferromanganese, and during pouring. Numerous circular, clear colored inclusions were found in all of them, the latter samples containing both large and innumerable tiny ones. In this case also the last sample is the purest. The electric steels are very interesting, especially in the contrast between the overoxidized test, rich in inclusions, taken after the removal of the first slag, and the finished steel, both after pouring into the ladles and after casting the last ingot. Even here a complete removal of the inclusions was not brought about. The acid open-hearth and crucible steel samples examined also showed inclusions.

Determining the Amount of Inclusions

The next paper, by F. Fischer of Bruckhausen, took up the question of the determination of slag inclusions from the chemical standpoint. It consists of a careful and critical review of the various methods proposed to separate and estimate the amount of the non-metallic inclusions. He considers the Eggertz iodine method to be the freest from errors and recommends the following modification: Ten grams of the drillings are weighed out into a beaker packed in ice, covered with 50 c.c. of ice cold recently boiled water, and 60 gr. of pure iodine added. The drillings are dissolved with constant stirring. Towards the end the whole may be heated on the water bath for a short time until any carbides or phosphides difficult to decompose are dissolved. After again cooling, 200 c.c. of recently boiled cold water are added, and the residue allowed to settle. This residue, consisting of carbon and slag, is then filtered through a Neubauer crucible and thoroughly washed, first with very dilute hydrochloric acid until the filtrate gives no iron reaction with sulphocyanide; then with water until no chlorides are present. The crucible is then dried and weighed. The residue is next removed and the carbon estimated in the usual way by ignition in a stream of oxygen. The difference gives the weight of slag in the sample of steel.

This method, however, is not strictly accurate, for if there are some carbides or phosphides that do not dissolve even after the gentle heating, they will influence the weight of the slag residue. This question must be settled by further experiments. No results of determinations are given, but the interesting fact is mentioned that little particles of quartz can be distinguished in the residue under the microscope. The discussion resolved itself largely into a consideration of the question of distinguishing clearly between open-hearth and Bessemer steel, and whether this matter of non-metallic inclusions would throw any light on the subject. Nothing especially new was brought out.

Physical Properties and Non-Metallic Impurities

Another paper was by F. Packer of Duesseldorf-Rath, on the various kinds of non-metallic inclusions found in steel, their probable origin, and methods to prevent their

appearance. He considers that these inclusions play a large part in causing the differences often found in physical tests cut from the same piece of steel, and especially when cut with and across the direction of rolling or forging. The great disadvantage of these inclusions is that they act like little notches cut in steel and cause it to fracture under stress before it should.

The results are given of a series of tests carried out on samples of basic open-hearth steel furnished by the Verein. Bending and tensile tests, the latter taken across the direction of rolling, all gave very low results in regard to ductility. The fractures of the tensile tests are illustrated, and all show a fibrous, platy appearance as well as the usual granular structure. Microsections were cut just below the fractures, carefully prepared and examined. They all showed a greater or less amount of non-metallic inclusions. These few results were given to prove that there is a relation between irregular fractures and unfavorable physical properties on the one hand and the presence of non-metallic impurities on the other.

In regard to the origin of these inclusions it is natural to suppose that the various refractory materials which are in contact with the steel a long time are slagged more or less; for instance, the lining of the ladle, the stopper, the nozzle, the lining of the pouring funnel, and the runner bricks. The amount of slag formed will vary with the kind of refractory material, the temperature and composition of the steel. Another important point is that the amount will be the greatest where the stream of steel has a mechanical influence, as well as being at a high temperature and in contact for a long time. Each of these refractories is then dealt with separately and in detail, both in regard to the action of the metal and furnace slag on them, and the possibility of the slags produced entering the steel. The necessity and importance of using only the best materials is pointed out.

The second source of these non-metallic inclusions is the furnace slag. During the operations of blowing, tapping and pouring, a more or less thorough mixing of steel and slag is brought about, and the slag may easily be divided into extremely fine particles. The extent to which these particles collect together and rise to the surface depends on the time available and the fluidity of the steel; in other words, on the temperature. The third source is the use of deoxidizing materials giving, for instance, the yellowish white "sand spots" and alumina from the high percentage ferrosilicons and aluminum employed. Similarly, of course, ferromanganese or spiegel mixtures will give rise to deoxidation products.

Three Groups of Inclusions

The inclusions as a whole vary greatly in appearance and distribution. The following three groups may be separated:

1. Inclusions visible to the naked eye, usually in groups, and mostly on the outer surface.
2. Inclusions visible to the naked eye and which are scattered more or less through the whole structure of the steel.
3. Small microscopic inclusions tolerably uniformly distributed between the crystals, sometimes present in large amount, and which are of about the same shape.

The first two kinds most probably arise from the slagging of the refractory materials, or from the furnace slag mechanically mixed with the metal. Concerning the third kind it is possible that it arises from the action of the ferrosilicon or aluminum on finely divided particles of furnace slag.

This separation into three groups may be helpful in bringing about a systematic study of the question, the first two belonging more to the refractory materials and the technology of casting and pouring. A great number of points for investigation come readily to mind in this connection, such as the choice of the best refractory materials for the various positions, the inclination of the tapping spout and the size of the tapping hole, also the best shape of stopper and nozzle to avoid so far as possible a rotating stream when pouring. Every effort must be made to prevent the steel and slag being vigorously mixed together. Mention must be made of the fact that tests taken immediately before tapping show much greater freedom from slag than samples taken after tapping or

pouring. This supports the view that the defects have their origin after the metal leaves the furnace.

Chiefly Deoxidation Products

The discussion was very interesting. The first speaker had noticed some inclusions light in color and others that were darker, in his own steels. The first he considered to come from the refractory materials and the others from the ferrosilicon and aluminum. The latter are not so pronounced if liquid instead of solid ferrosilicon is used. The next speaker had collected some inclusions that looked like yellow sand, and found the analyses to be

MnO	45.90%	43.40%
FeO	18.27	18.36
SiO ₂	36.75	37.70

They are plainly deoxidation products. He considers that the refractory materials are not responsible for the large majority of the non-metallic inclusions. This belief is confirmed by other speakers who consider them to be chiefly deoxidation products. Another speaker had found some of them to come from the graphite or clay wash used to coat the molds, and avoided them by the use of tar. The discussion closed with a recognition of the importance of the subject, and the necessity for further work.

G. B. W.

New Blast Furnace of Maryland Steel Company

A Compromise Between a Thin Lined and a Thick Lined Stack—Novel Features of Top, Skip Hoist and Coke Feed Roller

The reconstruction of B furnace of the Maryland Steel Company at Sparrows Point, Md., which is now under way, gives timeliness to a description of the reconstructed A furnace, completed last year, of which the new B stack will be substantially a duplicate. The original furnace A was built and blown in for the first time in 1888. It represented, with the other three stacks at this plant then under construction, the most approved design of the time. It was equipped with a centrifugal dust catcher, overhead gas flues, Witherow's improved Whitwell stoves, water tube boilers, and double vertical blowing engines of very substantial construction. The furnace was filled by a car system and a vertical hoist, with an electric transfer system in the stock house. In the 25 years that have elapsed great progress has been made in blast furnace design, and from time to time steps have been taken at Sparrows Point towards bringing what was at its inception the most modern equipment, to the same position to-day.

The first part of the equipment to be replaced was the blowing engines. Compound duplex horizontal vertical engines were installed in place of the old ones. Then the stoves were raised, relined and the old miter tops replaced by dome tops. With the blast ample both in quantity and temperature, the next problem taken up, somewhat more than a year ago, was the reconstruction of the furnaces proper and, as at that time furnace A required a new lining, it was selected as the first to be improved. After careful inspection it was decided to remove entirely the old stack and to erect on the foundation a thoroughly modern stack, at the same time replacing the old stock house system with an efficient stocking and filling equipment.

Furnace Construction

The construction adopted represents, as shown in the first illustration, a compromise between a thin lined and an internally cooled thick lined design. The hearth is enclosed by a heavy rolled steel jacket, cooled by vertical water-cooled staves, and the bosh is cooled by rows of bronze plates retained in cast iron holders. The mantel is of riveted steel plates and the shell, of hearth steel plates, springs from the center line of the columns, giving at this point a brick lining of 36 in. It is drawn in sharply above the mantel, and at a point about 15 ft. above the mantel the lining is 27 in. in thickness. There are ten rows of cooling blocks consisting of cast iron segments with pipes cast in. The first four rows above the mantel have three separate pipes in each segment and the remainder have two rows. The water connections are made so that if the water pipe in any segment should leak it may be cut out without interfering with the circulation of water in the remaining coils in the same segment.

The top of the furnace is provided with four downcomer openings placed at equal distances around the tunnel head, and to resist the abrasion of the stock at the top cast steel plates 3 in. thick are suspended from the top brackets and held in the shell by substantial stays both

top and bottom. These castings are strongly ribbed to prevent warping.

The tunnel head ring and supports, as shown, are formed together in a substantial steel casting, which gives a flat top that is as strong as a dome construction and entirely gas tight. This casting is made in four segments, shrunk together with heavy cast steel links, and fitting into the shell deep enough to provide ample support for the top castings and a very strong connection to the shell. The cast steel gas seal and main hopper are machined where they come in connection with this tunnel head casting, and in addition there is a deep pocket provided for packing with loam.

The lip ring is held by eight heavy steel bars, which secure it firmly in place from movement either up or down. These bars extend through the gas seal and are keyed through bosses in same, so that the keys are always accessible and under inspection. All the top castings are of steel and extra heavy.

In place of the usual gas seal bell is a slide operated by a steam cylinder controlled by an oil cylinder. The main bell is hung from a steel cross beam and operated by a steam cylinder with oil control. To handle the top castings in making repairs, two jib cranes are provided.

Only one bleeder is provided and the four downcomers are brought into one connection in such a way that the angle of slope is always great enough to make the pipes self-cleaning.

The main downcomer is brought into a large dry dust catcher tangentially to the shell, so as to give some centrifugal action, and from the dome of this dust catcher the gas is taken to two Kennedy centrifugals and thence to the gas mains.

The Skip Hoist

To secure a uniform distribution in layers a bucket skip with rotation was adopted and at the outset an experimental bucket was tried out with various charges to determine the proportions best adapted to handling Mayari ore, which must be used at this plant, as the company has large interests in that Cuban district. A straight, cylindrical bucket was adopted, with a bell the full size of the cylinder, the experiments having shown that any revert at the bottom of the bucket either entirely holds back a part of the charge or delays its movement to such an extent that the time required to empty the bucket is prohibitive.

The large bell necessitated making the bucket with an unusually large base, namely, 8 ft. 6 in.; accordingly the skip incline is unusually wide and the gas seal so large that, as stated above, a slide is used instead of a bell.

The skip incline is unusual in being supported entirely independent of the furnace, and is merely steadied sideways at the top of the furnace shell. The support for the incline serves as a runway for the counterweights, and the hoisting and counterweight ropes, while direct and simple, locate the hoist on the ground level directly under the bridge proper, where it is most accessible. An 18 x 18-in. Otis steam hoist is used.

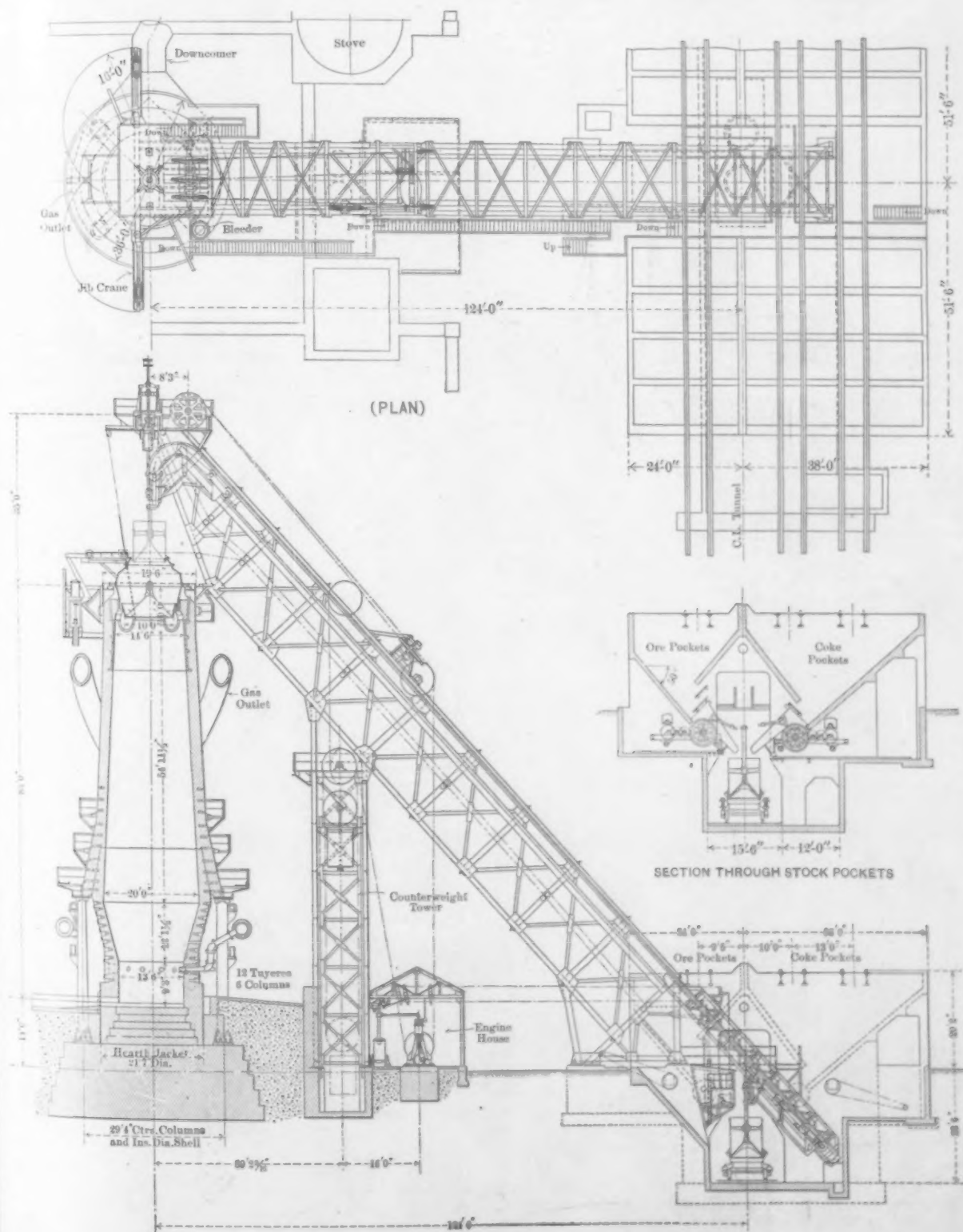
To keep the bucket from swinging, a Kennedy parallel motion skip car is used, with the unusual feature that means are provided for picking up and detaching the bucket automatically, regardless of the position it occupies after rotation, and also means for automatically locking the stem of the bucket to the car. These patented features are clearly shown in the illustrations, and it will be noted that the stem of the bucket is unusually long and terminates with a mushroom head. Since the automatic locking takes place in the first few feet of hoist, the bucket is rigidly locked to the skip car during practically its entire travel, and is considered as safe against detachment as a non-detachable bucket.

To avoid damage to either the skip car or bucket in case of over-winding, breaking pins are provided in the safety latch over the top of the bucket stem, so that in case the hoist does not stop at the proper time, these pins

will be sheared off and the skip car carrier will simply be forced down on the bucket stem without damaging anything.

The skip car is of liberal proportions and so constructed that the axles with the wheels on them may be readily removed, and provision is made in the lower part of the skip incline for dropping one or both of the supporting rails, so that the entire skip car may be removed intact.

The liberal size of the skip incline, due to the large bucket, permits of the main bell and top casting passing up through it, and to this end the diagonal braces in the bottom lower cord are made removable and, as the skip car is well adapted to land anything on the center of the furnace, the top changes can be made by way of the skip incline, although the jib cranes on top will handle anything.



Section and Plan of Furnace and Skip Hoist, with Section of Stock Pockets

The operator's stand is at the bottom of the skip incline, with a clear view both ways of the larry car track and a clear view up the incline. It contains indicators showing the seating of the skip bucket at the top and the movement of the gas seal slide and the main bell; also the usual sounding winches.

The three levers controlling the motions of the hoist, the gas seal slide and the main bell interlock and a proper cycle of these motions is thus insured without thought on the part of the operator.

The Ore Scale Car

The larry car carries two buckets on rotating tables in conformity with Williams, Diehl and Ahlen's patents and the usual equipment of four motors—two for running the car, one for rotating the tables and one for lifting the load off the knife edge. The scale levers are extremely simple, four levers carrying the entire load and a fifth leading to the scale platform. The scale box contains a set of Fairbanks standard beams and is fitted with an indicator which shows the load approximately and enables the operator to cut off the stock supply accurately.

Stock Bins

The stock bins are of reinforced concrete with steel track beam. They are of liberal proportions and so arranged that the larry car tracks and all operator posts are well lighted and ventilated. They are lined with renewable cast iron wearing plates and fitted with feed rollers which deliver the stock directly into the rotating bucket. The coke is screened by feed rollers of unique design, which are illustrated in detail.

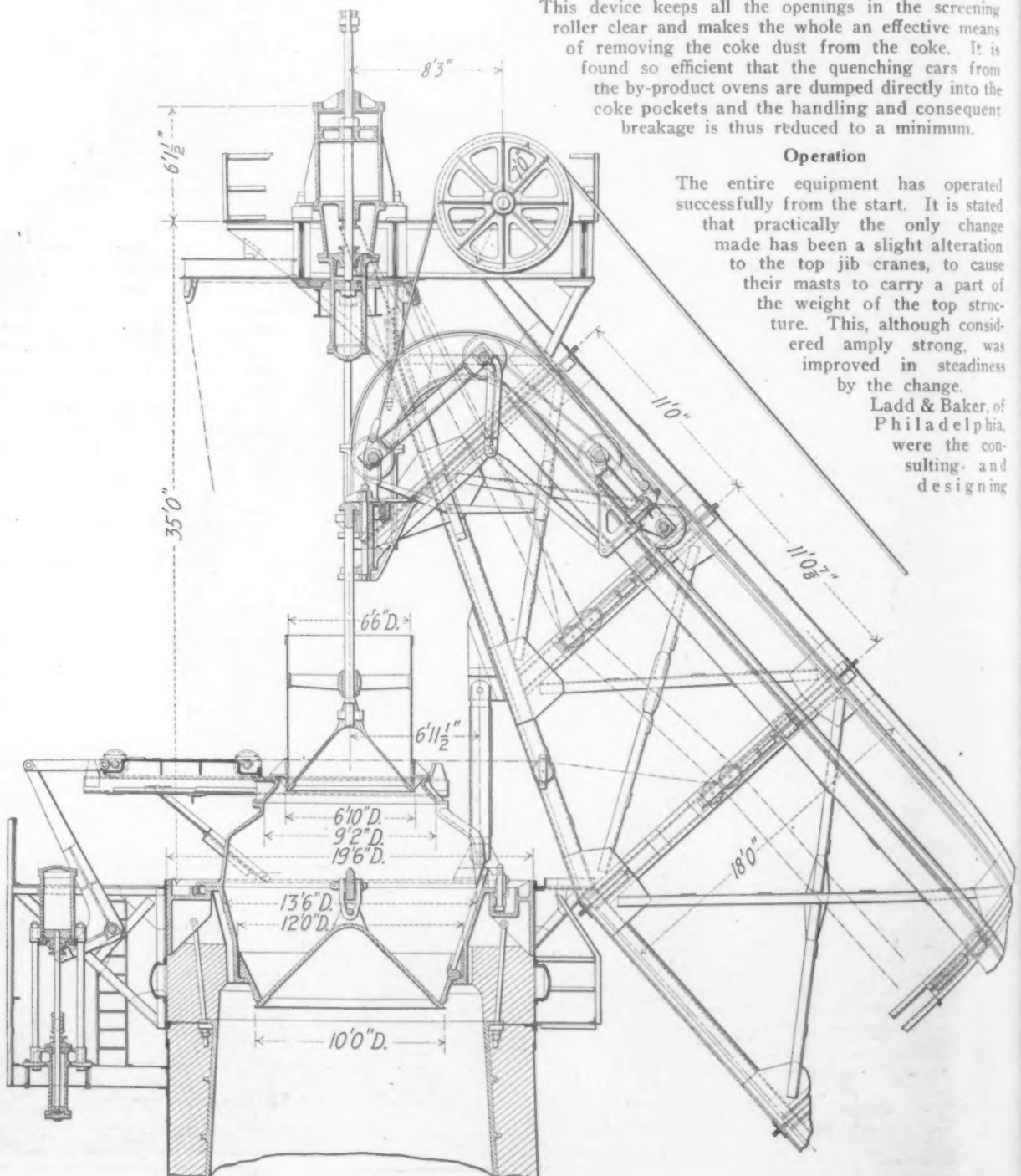
The usual feed roller for screening coke is a steel plate drum perforated with holes about $\frac{3}{4}$ in. in diameter. The designers of the new Sparrows Point furnace considered that such perforated rollers do not thoroughly screen the coke, but actually make braize, as a large part of the motion is often at a speed different from that of the coke moving over them, with the result that the ends which project down into the perforations are sheared off. The rollers shown have surfaces made up of numerous parallel rings, which allow the braize to pass through without any grating action and thence to a belt conveyor.

To take off the screened coke into the skip bucket a short chute is provided having an edge like a comb, with fingers extending into the spaces in the roller surface. This device keeps all the openings in the screening roller clear and makes the whole an effective means of removing the coke dust from the coke. It is found so efficient that the quenching cars from the by-product ovens are dumped directly into the coke pockets and the handling and consequent breakage is thus reduced to a minimum.

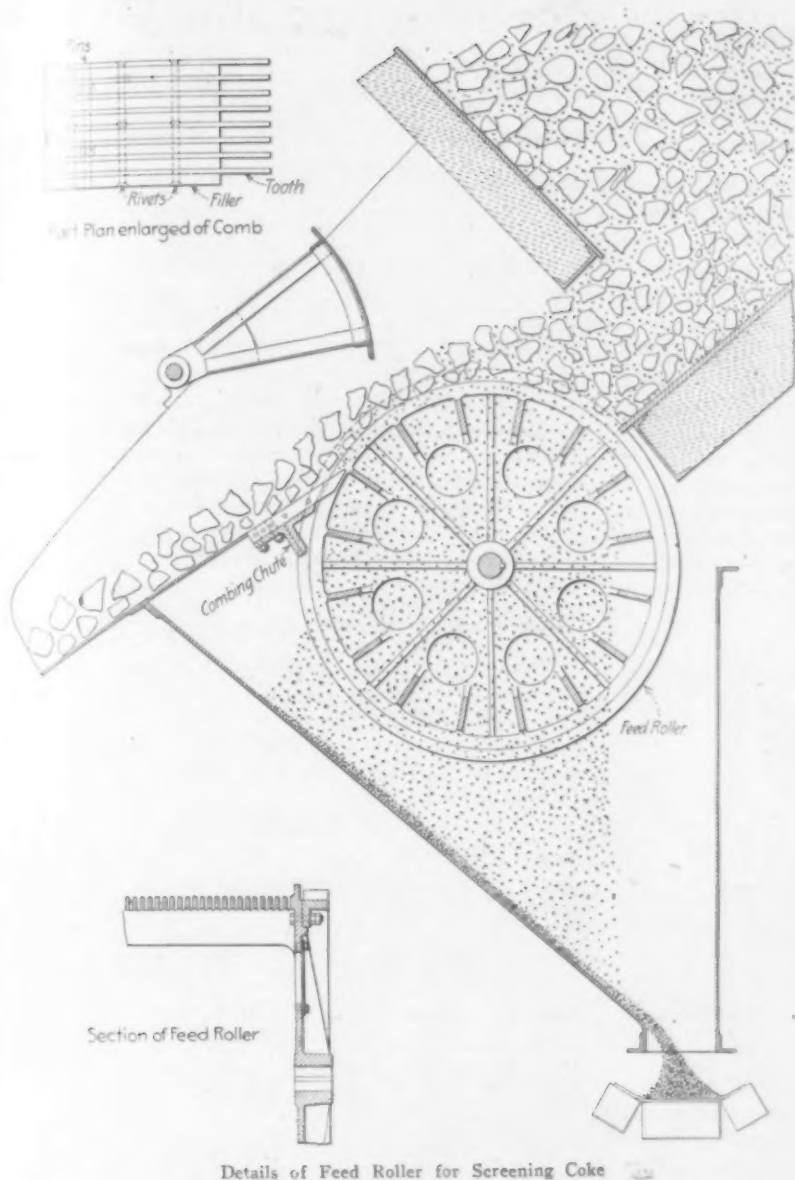
Operation

The entire equipment has operated successfully from the start. It is stated that practically the only change made has been a slight alteration to the top jib cranes, to cause their masts to carry a part of the weight of the top structure. This, although considered amply strong, was improved in steadiness by the change.

Ladd & Baker, of Philadelphia, were the consulting and designing



Section of Furnace Top



Details of Feed Roller for Screening Coke

engineers for this furnace. It is an interesting fact that when the old furnace was built in 1888 it was under direction of the same men, Mr. Ladd being at that time the engineer and Mr. Baker in charge of the construction and operation of the plant.

A Heavy Haul by a 6-Ton Truck

Forty-six tons were recently hauled from the Municipal Building, at City Hall, New York City, to Sixty-seventh street and the East River by a La France hydraulic truck. The truck, itself weighing $4\frac{1}{2}$ tons, was loaded with 6 tons of boiler fittings; behind was attached a wagon weighing $12\frac{1}{2}$ tons and carrying a boiler weighing 23 tons. At least 20 horses, it is estimated, would have been required to haul the load, not to mention the blocking of traffic while they

were passing. The La France truck is 20 ft. long in comparison. The run was made with the truck in half the time it is believed that horses would have taken.

The run is regarded as good proof that the hauling of heavy materials through the streets of cities by heavy motor trucks either with or without trailers is of advantage. It is held that it was only because of the hydraulic transmission of the La France truck that it was possible to start and stop with such a heavy load, without straining any of the parts of the truck. It is emphasized also that there was not a single part of the truck overloaded, as it is not possible to overload a La France truck, because before it gets overloaded the relief valve opens and thus relieves the pressure of the oil.

Since writing the foregoing it is learned from the Hydraulic Truck Sales Company, New York City, that a similar load was handled by a La France hydraulic truck hauling a boiler from Nineteenth street and Second avenue to Sixty-eighth street and the East River, going up Broadway to Fifty-ninth street. The truck proceeded at a rate of about 4 miles an hour through New York traffic under good control.

The Blaw, Steel Construction Company, Westinghouse Building, Pittsburgh, Pa., with plants at Reynoldsville and Hoboken, Pa., has recently taken contracts for 3000 tons of galvanized transmission towers for shipment to Spain; 200 tons of similar towers for shipment to Keokuk, Iowa; two steel viaducts for the West Penn Railroad Company near Scottdale, Pa., and important steel form contracts.

The Metallic Packing & Mfg. Company, Elyria, Ohio, announces that, regardless of any statements to the contrary, its factory or product is not controlled in any way by other parties connected with the sale or manufacture of fibrous or other packings. It is not a branch of any other company, but is absolutely independent, and no other makers have any further interest in its factory than the privilege of buying its product.

The C. & C. Electric & Mfg. Company, welding department, Garwood, N. J., desires to receive catalogues from every consumer of sheet steel showing the articles manufactured. The company states that compliance with this request will be appreciated and may prove to be of mutual benefit.



View of the La France Truck with Its Own Load and the Trailing Load

Selecting the Correct Machine for the Work*

The Economical Range of Production for Which Each Kind of Machine in the Machine Shop Should Be Adapted

—BY STUART DEAN—

The different operations in a machine shop are few in number. They are the machining off of a flat surface, the turning off the outside of a cylindrical surface, the machining the inside of a cylindrical surface (boring), drilling, tapping and threading. For each of these operations there are a number of styles of machine tools from which to select.

For machining a flat surface the milling machine, the planing machine or the shaping machine, the lathe or boring and turning machine, or the different forms of grinding machines may be used. In general, the disk grinding machine will turn out two to three times the work that the milling machine will do, and the milling machine twice as much as the other machines in a given length of time.

The Field of the Grinding Machine

The disk grinding machine will surface pieces 6 x 6 in. and under, of unrelieved surface, or 36 sq. in. actual surface, at a speed of 18 sq. in. per minute. On larger work than this the grinding pressure becomes so reduced that the work will be turned out more slowly than on the other types of machines that do surface machining.

The grinding machine's field of work is on pieces that may be trued up by taking off but little metal. One of its advantages, over the other forms of machine tools that do surface machining, is that it requires practically no chucking fixtures. The time and expense of chucking the work is eliminated, the work being held on the grinding table by hand. This makes machining practically a continuous process.

For small faces that are to be hand scraped, inexpensive little emery wheels are available. These are equipped with a longitudinal and cross slide carriage that will finish the work as true, or truer, than can be done by hand scraping, and in one-third the time. Such a machine will pay for itself in two or three months. For larger surfaces expensive cup-shaped wheel grinding machines of great output capacity and low operating cost per piece, are on the market.

Advantages of the Milling Machine

The milling machine is a rapid producer because cutting speeds of 70 to 90 ft. per minute can be used where 60 or 70 ft. per minute is the limit of a lathe or boring mill. Several cutters are working at the same time, compared to one, or at the most two, in other forms of facing machines. One piece can be chucked and unchucked while the machine is working on another, making the machining practically continuous. Two or three faces of a piece can be machined at one pass on a planer type milling machine with a number of heads. With this style of machine the machining cost is extremely low.

High cutting speed is possible on the milling machine because each cutter cuts only part of the time, and the cutter edge has a chance to cool between cuts. The milling machine has an enormous output when used with the cutter head or facing head. It will operate with a linear feed of 10 in. per minute on cast-iron surfaces on coarse work and 4 in. per minute on fine work, such as surfaces that are to be hand scraped. The lathe or boring machine can not compete with the milling machine feeding at these speeds.

The spindle of the milling machine should be at least

one-third the diameter of the cutter head. A weak spindle will spring, making an untrue milled face, unless the rate of feed is reduced. This is especially noticeable when machining a face that is partly interrupted and partly solid and broad. If the cutter head were backed up near its edge with a bearing shoe, the maximum speed and feed could be taken with no danger of the spindle springing. The spring back of the cutter head would be no greater than the down spring of a planer table.

A feed of 10 in. per minute can be maintained with a stiff spindle. A feed of 2½ in. per minute only can be maintained if the head and spindle springs. This is a 400 per cent. difference in the output of the machine.

Different Styles of the Milling Machine

The vertical milling machine is best adapted to small and flat work. If the surface milled stands high above the table, the horizontal pressure of the cut throws a heavy strain on the chucking fixtures or strapping-down bolts. High work tends to lift the table from the bed, and this produces chatter.

The horizontal spindle machine is free from the above faults. It is the ideal machine for fast and heavy cutting, as all the strain comes straight down upon the table. This strain, when cutting steel, may run as high as 100 tons on a powerful machine doing heavy work.

The milling machine table should be 6 or 8 ft. long. The long table keeps the wrench, used in strapping down the work, away from the revolving cutter head, and gives the workman plenty of room to chuck and unchuck pieces while the machine is on other work, thus getting a continuous output from the machine.

In handling a machine under the continuous system of cutting it is better to do the work in two sections, one at each end of the table. The machine should mill the piece or pieces at one end while the workman is chucking and unchucking at the other. Having a piece or pieces at each end of the table is better than placing them in a continuous line. In this way the operator will not drop into the habit of waiting for all the pieces to be finished before chucking a new lot. He will not hold the machine idle while he chucks these.

The advantage of the above method of arranging the work, instead of filling the table in a continuous line from end to end, is shown in the following example of work done on a Brown & Sharpe No. 5 milling machine. Pieces with a 5½ x 6-in. face were to be machined by means of a cutter head 7½ in. diameter, running at a speed of 40 revolutions per minute. This gave a cutting speed of 77 ft. per minute. The depth of cut varied from 0 to ¼ in., or an average of ⅛ in. Each piece required 2 minutes when arranged in a continuous line, as against 1½ minutes when chucked in two groups, one at each end of the table. The two operations may be analyzed as shown below. Two men, a machinist and a helper, operated each machine.

Continuous line milling:

0 min.	0 sec.	Start cut on 7 pieces.
4 min.	25 sec.	Helper starts unstrapping.
6 min.	25 sec.	Both wait for cut to finish.
7 min.	15 sec.	Cut finished. Start taking off the three remaining pieces and brushing off the chips from the table.
9 min.	15 sec.	Pieces all off, still brushing off chips.
9 min.	55 sec.	Start placing seven new pieces.
10 min.	40 sec.	Square pieces up with a straight edge.
11 min.	55 sec.	Both men pull straps down tight.
13 min.	10 sec.	Pieces secure. Run table back and feed up to take cut, using index dial on feed screw to set machine for cut.
13 min.	25 sec.	Start cut.
Cycle complete. 1 minute, 55 seconds on each.		

*Copyright, 1913, by Stuart Dean. Thirteenth article on Shop and Foundry Management. The twelfth article, "Getting the Most Out of the Shop," was printed in the issue of January 16.

How is the cycle of operations analyzed when machining the same job one piece at each end of the table:

0 min. 0 sec.	Run table to right end by power rapidly. This mechanism was put on the machine after it was installed, in the shape of two sprocket wheels and a chain belt.
0 min. 10 sec.	Feed in casting to correct depth of cut. Set this by micrometer dial.
0 min. 25 sec.	Cut started on left end casting. Operator and helper change casting at right end of table.
1 min. 25 sec.	Cut finished.
1 min. 30 sec.	Run table rapidly to other end by power.
1 min. 45 sec.	Cut started on casting at right end.
2 min. 35 sec.	Run table to right end.
Cycle completed.	1 minute 27½ seconds on each casting.

Cutter Heads

The cheapest way to make a small cutter head or facing head is to machine slots in the edge or circumference of the head, drive in steel cutters and peen the metal in the cutter head along the side of the cutters. All cutters should be put in at an angle so that the chip will be lifted from the work—not scraped off as is the case where the cutter is put in square. The easiest way to cut the slots is to first drill holes where the ends of the slots are to come, and then plane from the edge back into these holes. Afterward fill the holes by driving pins into them.

Limit Machine Production by Strength of Piece Worked

A machine should be powerful enough to do the work rapidly. The point that limits the output of a machine tool should be the strength of the piece worked on after it has been strengthened to resist a heavy cut. It should not be the power of the machine tool or the strength of the chucking apparatus. The work should be held in a fixture so secured and the machine should be so powerful, the feed and speed of the cut should be so great that any increase would distort the work or break it.

This rule secures the cutting limit, but how little is it being followed! The writer recalls a chucking lathe that was boring a 2-in. hole in a steel bar, using a Celfor drill. The feed was ¾ in. per minute. The correct feed for this size of drill in steel is 3 in. per minute. On speeding up the machine and increasing the feed, the belt slipped. By tightening the belt the speed was brought up to ¾ in. per minute, but the strain was so great on the machine that the teeth on the back gear tore out. The ¾-in. feed was too heavy for the machine. The ¾-in. feed was about the limit of its capacity.

Here was a machine whose output was only one-eighth of what it should be. The output on this operation could have been increased eight times. This is not an increase of 25 per cent. nor 50 per cent., but 800 per cent. If one of the office employees worked one hour per day and demanded eight hours' pay he would be thrown out. Yet that is what the chucking lathe was doing every day. Make the piece worked on decide the limit of the speed and not the machine tool. In this case it was the machine tool that settled the speed of output.

The limit of speed at which a piece of work can be machined is probably from ten to twenty times faster than is done on the average. The limit is unknown. Take, for instance, the boring of a 122-in. cylinder. One roughing cutter in a boring head, cutting 35 ft. per minute with a depth of ¼ in. on a side and 9/32 in. feed, will remove 14.72 cu. in. of metal per minute.

Put in six cutters, each with a feed of 9/32 in., or a total feed of 1 11/16 in. per revolution. If the cylinder is 15 in. long the roughing cut would be taken in one minute. This is ten to twenty times faster than is done on the average, and shows what is possible if we go to the limit. The casting might have to be straightened and well supported in a jig. Assuming ½ hp. per cubic inch of metal removed per minute, this machine would require a 45-hp. motor. The drive and feed gearing, the whole machine, in fact, would have to be designed to take care of this power.

The same proposition is true on the milling machine. Say 10 cu. in. per minute is a conservative estimate of the capacity of a single cutter. With cutters located close together in the cutter head so that six cutters would cut at

the same time, 60 cu. in. per minute would be the output. Sixty cubic inches per minute means machining a face 10 x 48 in. to a depth of ¼ in. each minute. This would take a 30-hp. motor and a machine built in proportion. If the milling machine were built strong enough and the piece worked on stiff enough to stand the strain of the cut, the above would be practical; that is, the tool steel would stand this cut. Are many doing this? No. That is why I say the average output can be increased ten to twenty times.

We do not know what the limit of drilling speed is. In a test, on cast iron, a 1¼-in. drill drilled 30 in. deep in one minute. This was the limit of the drilling machine, but not the limit of the twist drill.

Efficiency Society Meets Next Week

The annual meeting of the Efficiency Society will take place on January 27 and 28, at the Engineering Societies Building, 29 West Thirty-ninth street, New York City. The first session will open at 10 a. m. Monday morning, under the chairmanship of Harrington Emerson, and the session will be given over to the general subject of organization.

The second session is to be devoted to management, and there will be a dinner on Monday evening, with discussion of efficiency in departments of the Government, to be participated in by Government officials and presided over by Dr. Frederick A. Cleveland, director of President Taft's Commission on Efficiency and Economy in Washington.

Tuesday morning's session is to be given up to industrial relations, meaning the relations existing in industry among the three elements involved, namely, employer, employee and the public. The announcement of the meeting on this subject states that: "The personnel of this commission has already been named and is now before Congress for approval, and this session will be controlled by this commission if it crystallizes itself by that time; otherwise it will be in the hands of some of those who were directly instrumental in bringing it into existence."

Tuesday afternoon will be devoted to industrial hygiene, and Dr. Winthrop Talbot, editor of Human Engineering, is to conduct the session. The point in this session appears to be that while considerable attention has been paid to accident prevention, not so much study has been made of the prevention of disease in industry, and the question is to be exploited by doctors who are now making a specialty of preserving the health of employees in large manufacturing concerns.

Central Ore Sintering Plant at Buffalo.—A sintering plant for the treatment of blast furnace flue dust is under construction at Buffalo on land leased from the Buffalo Union Furnace Company. The operation will be carried on by the Sintered Ore Company and the Greenawalt process will be used. The engineering work is in the hands of Hamilton & Hansell, New York. The output planned for is 300 tons a day. It is expected the plant will be in operation early in April. Flue dust will be taken from the various blast furnace plants in and around Buffalo and sintered ore returned. David Dows, New York, is president of the Sintered Ore Company and M. R. Kelly is manager. A similar plant, consisting of one Greenawalt furnace, is under construction at the furnaces of the Northwestern Iron Company, Mayville, Wis.

The Western Efficiency Society, at its meeting January 10, elected the following directors to serve for the current year: W. F. Smith, Marshall Field & Co.; I. A. Berndt, Joseph T. Ryerson & Son; H. C. Furneaux, B. Kuppenheimer & Co.; Paul Butler, J. W. Butler Paper Company; H. A. Rose, Selz, Schwab & Co.; F. F. Main and George C. Dent. The officers chosen by the board are: Chairman of the board, I. A. Berndt; president of the society, W. F. Smith; first vice-president, H. C. Furneaux; second vice-president, Paul Butler; secretary and treasurer, George C. Dent, 56 East Randolph street, Chicago. Regular meetings are held on the second and fourth Friday nights of each month in the Western Building, 88 East Randolph street, Chicago.

The Science and the Art of Management

A Plea for Training in the Psychological Principles of Handling Men—Confusion Over Management as a Science

BY F. G. COBURN.*

Since the railroad rate hearings before the Interstate Commerce Commission in 1910 discussion of scientific management has been very common in all circles interested in the problems of management; it is to be regretted that the discussion not infrequently merges into argument! The technical and trade press has devoted considerable space to the subject, giving opportunity for everybody to read about the principles, creeds, philosophies, etc., of scientific management and furnishing the major part of the ammunition for discussion and argument; for, as a matter of fact, comparatively few have ever seen scientifically managed plants, and but a very few have really studied them. So it is well at this time to review the situation and see whether there is a tendency to cloud the real issue, and whether there is a great deal of unnecessary argument and strife.

Meaning of Scientific Management Not Always Understood

In the first place, if the subject of scientific management is to be discussed, it should definitely be decided what is to be considered as scientific management before the discussion starts; this highly important detail is very commonly forgotten in the heat of battle, so to speak. The scope of scientific management is variously estimated; from the inclusion of mere motion study only, all the way up to the inclusion of all factors and considerations affecting commercial and industrial activity.

For example, one frequently hears discussions of scientific management pro and con hinging about the possibility of its practice tending to reduce the workman by monotony of motion to a mere automaton, permitting his mind to atrophy. Those who argue that it will so result are allowing one phase of scientific management to obscure all the rest, to occupy in their conception of the subject such a commanding position as to make other considerations altogether unimportant.

On the other hand may be cited the belief of not a few that scientific management of an industry involves the selection of the industry, of the situation of the plant, building it, equipping it, gathering and organizing of the personnel, purchase of material and labor, manufacturing, marketing, and financing all through. What chance, then, would a man have, if he were in a business that is not particularly profitable as compared with others, his plant indifferently equipped and in an unfavorable location, were he to try to better his condition by the introduction and development of scientific management?

Motion Study and Time Study

Looking into this a little further it will be apparent that motion study, and the education of movement based on it, are component parts of the larger branch termed time study, which, briefly, involves the analysis of work, detailed study, synthesis based on the study, and systematic classification of the data thus obtained.

Now, no small number of people allow this branch, time study, to take up too much foreground when they look at the situation. Obviously if one party to a discussion is thinking of time study, the other of motion study, and if the subject in hand is "scientific management," there can be no fruitful result!

Time study is linked to payment of labor; unless a method of payment be adopted which will remunerate closely in proportion to value of services rendered, the full value of time study is not realized, to say the least. This is a very large and weighty consideration, and is a common pitfall for arguers—many a discussion of "scientific management" is an argument on piece work versus some other method—yet this is not important at all! If payment is actually based on value received.

Cost Keeping and System Not Scientific Management

Further, the value of motion study, time study and correct wage payment cannot be fully realized unless there is systematic use of them. In other words, careful records must be quickly made and constantly used, and great foresight employed in running the plant. This costs money. Thus discussion is precipitated on the cost of scientific management, red tape, the value of system, various ways of keeping costs, etc., the parties to the discussion believing that they are discussing scientific management!

It is not the writer's present purpose to define the term scientific management; the trade and technical press, books and periodicals, have presented any number of definitions, along with principles and philosophies to accompany the same, and it does not seem well to add to the number, even if it were possible; nor to point out which one of these many definitions is the best one, or the real one, for that might be considered an infringement of the personal prerogative of each individual seeker after truth. But it is perhaps pertinent to write something of the origin of the term.

It is certainly safe to say that in the majority of minds the term is connected with the name of Fred W. Taylor; and to point out that his first—and the first—paper on the subject (presented to the American Society of Mechanical Engineers in 1903), is entitled "Shop Management"; and that it treats of the organization, discipline, methods of operation, obtaining and filing information, setting tasks and paying for them—the general subject, in short, of the management of the shop within the shop.

Also to point out that the dictionary says that scientific means "of, pertaining to, discovered by, or used in science or the methods of science"; and, in turn, that science means "Knowledge gained and verified by exact observation and correct thinking, especially as methodically formulated and arranged in a rational system."

The Idea of Labor-Saving Management

A very valuable addition to the literature on this subject is the report on administration, presented by the subcommittee of the American Society of Mechanical Engineers at the recent meeting of the society. The committee after an exhaustive investigation of the history and development of mechanical processes, labor-saving machinery and management, sees an analogy between the development of management and the development of machinery, and offers the term labor-saving management to cover practically the same ground as is covered by Mr. Taylor's paper referred to above. If this suggestion were adopted the way would be clear to define scientific management as something either broader or narrower—certainly a generally accepted definition would save a great many words—and also to define "art" of management, and some other terms in promiscuous use but of unsettled meaning.

Assuming that the foregoing review will assist in confining discussions to real business, the writer offers some remarks based on the present situation. Every one, practically, recognizes the fact that there is more to management than system, time study, rules of discipline, etc. If not, then no one would succeed without them; and possibly examples could be produced to illustrate that even with them success was not met with. This other aspect of the problem is the human interest side. We are all—employer, executive and employed—"chock full of human nature," and due regard must be given to it.

Success Due to Practicing the Art of Management

We are told that tact is requisite, also diplomacy, patience, sympathy, workman's point of view, different methods of treating each individual, personal magnetism; is it not possible that all this side of the problem is a

*League Island Navy Yard, Philadelphia.

psychological study, and that it is susceptible of treatment and partial solution? Then we might really have an art of management. Calling on the dictionary again, art is defined as "the skilful adaptation or arrangement of means for the attainment of some desired end"; further, that in the highest sense, *art* has no synonym." Note that science is knowledge, but that art has no synonym; the nearest we can come to defining it is to call it a means to an end.

It is probable that the success of managers without scientific methods is due principally to the practice of the art of management (plenty of hard work is always assumed) and that by the adoption of scientific methods the practice of the art will be supplemented and furthered. Yet some prominent executives, who have made big successes of their work without the new methods, exhibit a little pique when scientific management is talked to them; they resent the inference that they have not been running their jobs scientifically. They, however, in the writer's opinion, are the real artists of the profession, who just naturally do things correctly. They succeed partly, at least, by the correct use of psychological principles; and if some of these principles might be formulated, a step would be taken toward a clear conception of the art. It ought to be possible to educate in this art, just as in the art of painting, or in the art of singing, in both of which we know that instruction and study—coupled with hard work—bring about results that could not be attained in the same time by individual application to the study of example. This, and instinct, appear to be all that the student of the art of management can look to at present.

Chilean Iron Ore for Bethlehem

A Line of Steamers Which May
Ultimately Carry 1,000,000 Tons a Year

On his return from Europe last week President C. M. Schwab of the Bethlehem Steel Company announced that he had completed arrangements with French interests and with the government of Chile by which his company will secure a considerable supply of iron ore from Chilean iron mines. The property is known as the Tofo Iron Mines and is operated by a French company in which Schneider & Co., of Creusot, France, have been interested, the mining concessions having been secured from the Chilean government. The mines are located about 25 miles north of Coquimbo, Chile, and about $4\frac{1}{2}$ miles east of the bay of Cruz Grande, from which the ore will be shipped. It is stated that a number of steamers will be built to bring the ore to the United States for the Bethlehem Steel Company. The bay of Cruz Grande is in 30 deg. south lati-

tude, and the distance to Philadelphia by way of the Panama Canal is about 4400 miles.

The deposit consists of two great outcrops of solid ore, with little or no admixture of rock, on the tops of two connected hills about 2000 ft. above sea level. Both hematite and magnetite are found and in places there is a mixture of the two. Analyses of a large number of samples show an average of more than 67.5 per cent. metallic iron, with phosphorus well within the Bessemer limits. Some portions of the deposit show ore very low in phosphorus. The ore is transported from the mines to a steel loading pier at Cruz Grande by cableways of the Pohlig system. The accompanying illustration gives a view of the cableway terminus and of the steel loading pier at Cruz Grande. It is the plan to proceed at once with the development of the property to a capacity of 1,000,000 tons a year. The amount of ore in the deposit is estimated at 100,000,000 tons.

The Bethlehem-Chile Iron Mines Company, with capital stock of \$4,000,000, has been incorporated in Delaware to carry on the operation of the Tofo Iron Mines. It will be a connected interest of the Bethlehem Steel Company. It is also stated that for the building of steamships to carry the ore to the United States the Bethlehem Steel Corporation will issue \$5,000,000 to \$7,000,000 of 5 per cent. bonds and that the financing will largely be done by foreign banking interests with which Mr. Schwab's recent negotiations were carried on.

The Bethlehem Steel Company has been seeking new sources of ore supply for several years. Its name has been connected with developments in Texas, but it is not known to have acquired any property in that State. For the past few years the company has shipped from 300,000 to 350,000 tons of ore a year from mines of its connected Juragua Iron Company, operating in the Santiago district of Cuba. It also has a majority interest in the Cheever Ore Company, whose mine two miles north of Port Henry, N. Y., has a shipping capacity of over 400 tons a day of cobbled ore and concentrates. All the output of this mine is taken by the Bethlehem Steel Company. Announcement was made more than a year ago of the Bethlehem Steel Company's contract for Swedish ore under which upwards of 3,000,000 tons will be shipped to this country over a period of nine years. It is stated that the ore requirements of the company's blast furnaces are now nearly 1,500,000 tons a year.

The American Steel & Wire Company, January 14, announced an increase in extras for coppered and liquor finished wire of 10c. per 100 lb., thus making on common grades 40c. advance over the base and on extra grades 60c. advance. This change is necessitated by the conditions which have obtained in the trade for some time.

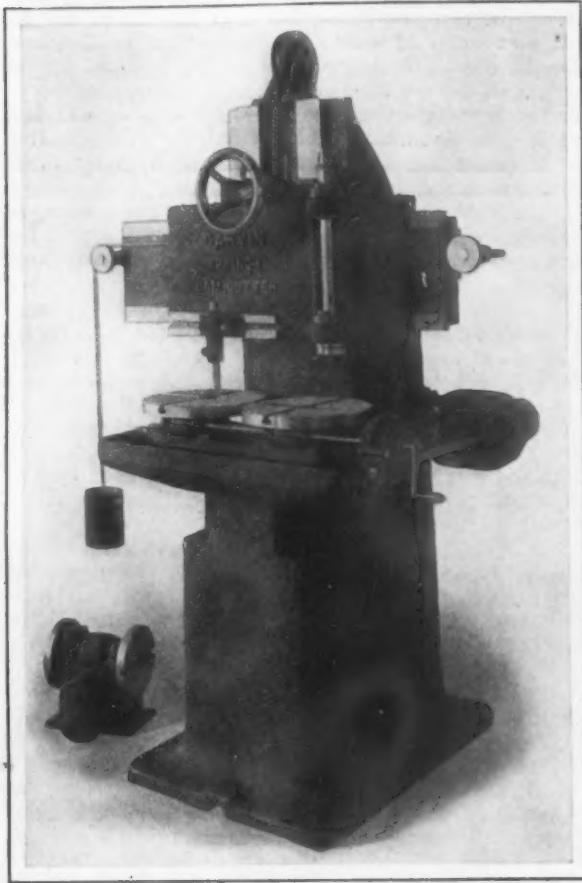


Terminus on Bay of Cruz Grande, Chile, of Cableway from Tofo Iron Mines. Also Steel Loading Pier

S. DIESCHER & SONS,
Mechanical and Civil Engineers.

A Small Face or Barrel Cam Cutting Machine

To meet the demand for a small size cam cutting machine the Garvin Machine Company, Spring and Varick streets, New York City, has recently brought out a new



A New 12-In. Cutting Machine for Face or Barrel Cams Built by the Garvin Machine Company, New York City

machine tool. It is well adapted for cutting face or barrel cams up to a maximum of 12 in. and also for the use of lubricant. The design follows closely that of the builder's 24 and 36 in. machines. The change from the face to the barrel cam fixture is easily and quickly made, the latter fixture being shown on the floor in the accompanying engraving.

The spindle has a No. 7 Brown & Sharpe taper. The spindle slide is very sensitive, running on large balls in steel tracks and the spindle bearings are of a style similar to those used in profiling machines. The feed, which has eight changes through gearing, can be reversed instantane-

ously or entirely thrown out of engagement. A rotary nut with a ball thrust bearing operates the rail slide and gives a quick motion for the removal of the cutter and former pin upon the completion of the cam. While the change is being made the spindle slide is clamped in position and returns to a positive micrometer stop.

The following table gives the principal dimensions and specifications of the machine:

Capacity, any type of cam, in.....	1 to 12
Brown & Sharpe taper of hole in spindle.....	No. 7
Minimum size of cutter head, in.....	3/16
Maximum size of cutter head, in.....	1
Number of speed changes.....	8
Throw of barrel cam, in.....	6 1/2
Swing of barrel fixture, in.....	14 1/2
Diameter of tables, in.....	12
Center distance between tables, in.....	12 1/2
Maximum distance from end of spindle to center of barrel cam fixture, in.....	7 1/4
Maximum distance from end of spindle to rotary table, in.....	11 1/4
Minimum distance from end of spindle to rotary table, in.....	3 1/4
Speed, r.p.m.	300
Floor space required, in.....	32 x 35
Domestic shipping weight, lb.....	2165
Foreign shipping weight, lb.....	2400

The drive is from a universal joint from an overhead countershaft, and there are three speed changes available through a three-step cone pulley. All of the gears of the machine are protected by guards, so that there is practically no danger to the operator.

A New Double Opposed Corerom Sand Shaker

To double the service obtainable from a single actuating mechanism with an attendant economy of space, and to secure the advantages of compensated motion in an apparatus ordinarily subjected to all of the severity of rapid reciprocation, a duplex sand shaker has been perfected by the Duplex Shaker Company, 1535 West Thirty-fifth street, Chicago, Ill. The shaker is designed to be operated by air or electric current, and in Fig. 1 is shown arranged with a pneumatic cylinder and in Fig. 2 with electric motor, from which the inclosed crankshaft is driven by a high speed silent chain.

The apparatus consists of two standard sand riddles held in circular clamps that are adjustable in diameter for varying sizes of riddles. These clamps are mounted on rocker arms, the rocker shaft being hung in bearings at each end of a rigid maple frame which makes the whole readily movable to any convenient location in the foundry. From the view of the crankshaft in Fig. 1 it is obvious that the riddles are simultaneously reciprocated in opposite directions, with the result claimed by the maker that the vibration and shocks of operation are absorbed and neutralized and the racking of the mechanism and stand reduced to a minimum. This not only permits a lighter construction of the supporting frame than would be possible otherwise, but is conducive to continuous service and long life of the reciprocating parts. Provision is made either with the air or electric motor for full speed regulation and easy control.

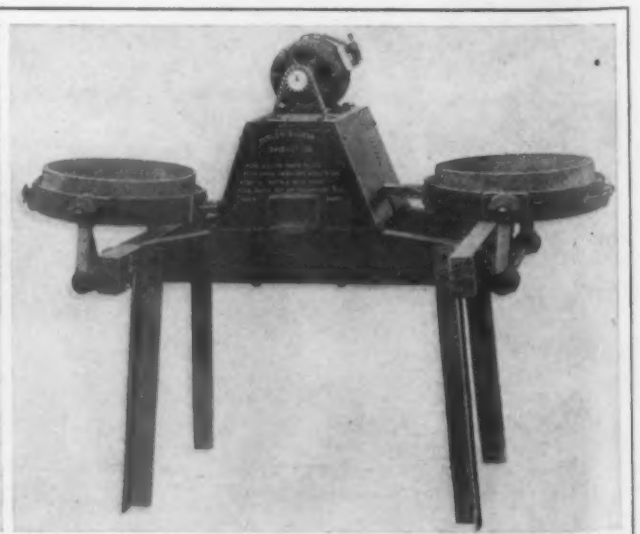
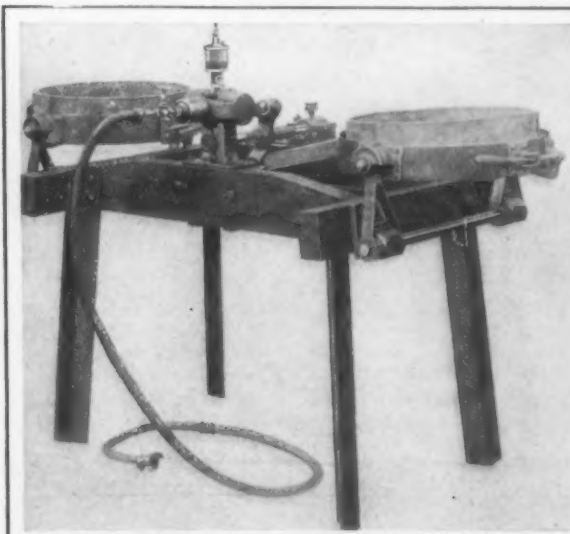


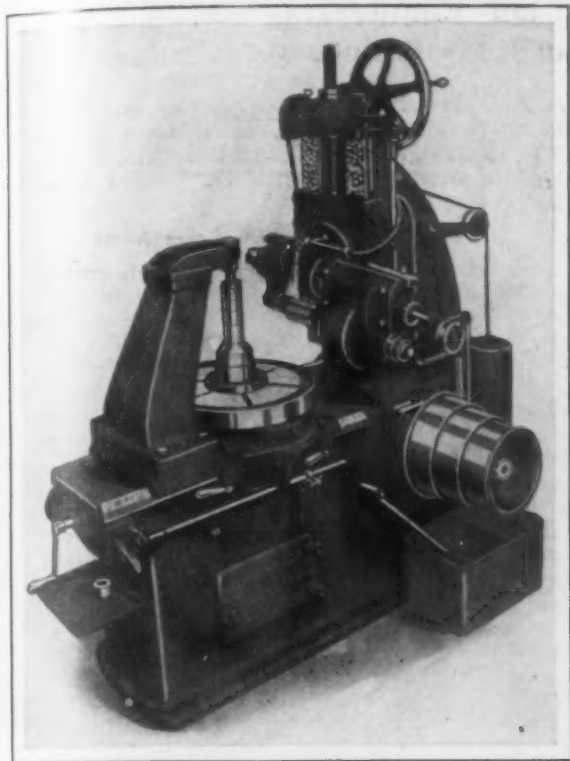
Fig. 1—Pneumatic Cylinder Type

Fig. 2—Electric Motor Drive

Two Styles of the New Double Opposed Sand Shaker Built by the Duplex Shaker Company, Chicago, Ill.

A Special Machine for Hobbing Automobile Gears

To enable automobile gears to be turned out rapidly and accurately from nickel chrome and vanadium steel blanks which have been heat treated before machining,



A New Machine for Hobbing Automobile Spur and Worm Gears Built by Schuchardt & Schütte, New York City

Schuchardt & Schütte, West Street Building, New York City, have brought out a new type of gear hobbing machine. The fact that the machine is not designed for the production of spiral gear work has resulted in an important improvement in the design, since it is not necessary to set the hob at the angles required when spiral gears are being cut. Among the special features in the design of the machine which are worthy of mention are the locating of the hob below the center about which the cutter head is swung with a consequent reduction in the overhang, a general strengthening throughout of the various parts of the machine, the employment of a fixed feed screw and a rotating nut instead of turning the feed screw in a nut, which is the customary arrangement, making the arbor support an integral part of the table, and a special type of lubricating device for the table.

As has been mentioned in the preceding paragraph, the locating of the hob below the center about which the cutter head swings, has reduced the distance between the hob and the face of the upright to $5\frac{1}{4}$ in. The leverage has been reduced and the thrust upon the cutter head when the hob is being fed across the face of spur gears is also better taken care of by this design. As a result of these improvements it is pointed out that when the machine is driving a high speed steel hob at its full capacity chatter or vibration is eliminated. The design of the machine has been strengthened as compared with the previous types, and this especially is true of the upright and the cutter head.

Belt drive is employed, and there are six available speeds, three through the steps of the cone driving pulley and the remainder through the back gears, which are located in the bed of the machine. These gears are engaged by the shifting of a knob on the end of the driving shaft. From the driving pulley shaft the power for operating the cutter is transmitted through a vertical shaft in the upright and two horizontal ones transmitting power through three pairs of bevel gears and one pair of helical gears. Phosphor bronze is employed for one of the gears in each pair, while the mating gears are of steel. The feed and the spacing mechanisms have power transmitted to them through a horizontal shaft that connects with the main

pulley shaft through a bevel gear and pinion. In the accompanying engraving it is not possible to see the gears for the spacing mechanism, since they are mounted at the end of the bed behind the upright. The spacing shaft, running along the side of the bed, receives power from these gears and drives the table through a worm which meshes with a worm gear on table. A special arrangement is employed for lubricating this worm and worm wheel. Below the worm is an oil reservoir into which a small wheel meshing with the worm dips. As this wheel rotates, a continuous supply of oil is carried up to the worm. At the point where the worm wheel comes out of contact with the worm there is a felt wiper, the office of which is to remove superfluous oil and permit it to drain back into the reservoir.

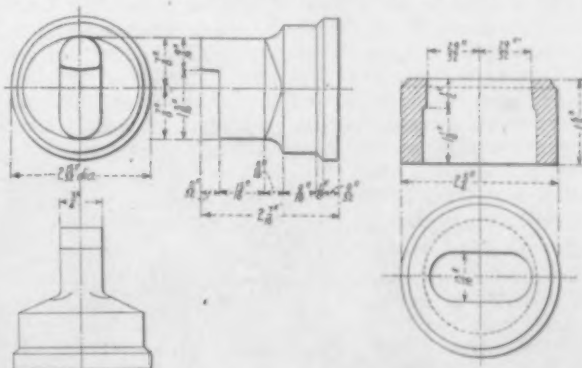
The table has a rigid arbor support which forms an integral part of the table, and the table and oil tray are cast in one piece, so that there is no space for chips to work into the bearing. A handwheel for use in setting the table into the proper position for giving the required depth of cut in hobbing spur gears is provided for the table feed screw. The pitch of this screw, which is $1\frac{7}{16}$ in. in diameter, is 0.2 in., and it has a dial graduated to read in thousands of an inch.

This machine can be used for hobbing spur gears and worm wheels up to a maximum diameter of 20 in. and a face width of 10 in. When spur gears are being cut the cutter head is fed down by a vertical feed screw, the drive being secured by rotating a nut on the fixed feed screw, instead of having the feed screw turn in a fixed nut, which is the customary way. This design causes the nut to push on the feed screw and eliminates torsional strains. The table is fed in toward the hob when worm wheels are being hobbled by the feed screw in the bed, the power being transmitted by a worm and worm wheel. Automatic stops are provided for the feeds for both the worm and spur gear feed screws, so that the drive is thrown out when the cut is completed.

A Ripping Punch and Die

BY EDWARD J. KNAPP

A punch patterned after the accompanying sketch was made with the end in view of expediting punching, saving a chipper's time and doing a good, clean job in cutting manholes, hand holes, circles and curves that cannot be



Details of Ripping Punch and Die

cut with a shear or ordinary punch in structural material. The punch is made of ordinary tool steel and given the same clearances as those now in use for punches. The dimensions have been found practical for the general run of work, but can be changed to suit requirements. It is necessary to start with a lead hole or at the edge of the metal. The lead hole can be made when the rivet holes are punched, so an extra setting will not be necessary. This ripping punch cuts $1\frac{3}{16}$ in. of metal at every stroke and leaves a smooth edge which is easily dressed up with a file.

The Republic Iron & Steel Company has sold to the Chicago House Wrecking Company its East St. Louis plant known as the Tudor works, the sale including buildings and equipment with a stipulation that the plant must be dismantled. The equipment has already been offered for sale by the buyer.

The Progress of Shipbuilding in 1912

Many Vessels Ordered for Ocean, Lake and River Transportation and Engineering Developments Being Watched with Interest

In the year 1912 the tonnage of ships built in the United States ship yards, or for which contracts were closed, exceeded that of 1911 by approximately 40 per cent. and if the prospects of 1913 are realized the new year will show a substantial percentage of increase over 1912. Not in many years have the ship yards had so much work on hand as they have at present and had in 1912. The foregoing observations were made by H. L. Aldrich, president Aldrich Publishing Company, Inc., publisher of International Marine Engineering, in the course of a survey of the shipbuilding industry. To a representative of *The Iron Age*, Mr. Aldrich said:

Awakening in September, 1911

"Up to September, 1911, the shipbuilding industry was very quiet. The yards had little to do and many gloomy expressions were heard. In this month, however, International Marine Engineering published a list of 37 ships, orders for which were under consideration and involving 12 steamship companies. It was predicted that the Hawaiian-American Line would order four and possibly six vessels, but, as a matter of fact, eight was the final figure. The Pacific Mail Steamship Company placed orders tentatively, but these were canceled because of the action of Congress in passing the Panama Canal bill prohibiting railroad-owned ships from using the canal. The Clyde Line placed an order, as did the Southern Pacific or Morgan Line. The Standard Oil Company was mentioned in the forecast as likely to order two vessels, but five were ordered instead. The Pacific Coast Steamship Company placed an order for one ship and expects to order another. The Porto Rico Line ordered a vessel, as was predicted, and so did the United Sulphur Company. Out of 12 companies named in September, 1911, nine have placed orders. The plans of one company failed because of the impossibility of raising money under the handicap imposed by the United States Post Office Department; a second placed an order, but later canceled it because of canal legislation, while a third line has not acted, but is expected to do so almost daily. Of course, many of the ships ordered in 1912 are not yet in commission, but they will be in the course of this year. Outside of the company mentioned as hesitating in the placing of an order, there are at least 25 vessels contemplated and it seems a pretty sure thing that nearly all will become realities.

Eastern Ship Yards Busy

"The Newport News Shipbuilding & Dry Dock Company, Newport News, Va., has in hand 11 or 12 contracts for merchant marine vessels, together with a large amount of government work and is giving employment to approximately 5000 men.

"The New York Shipbuilding Company, Camden, N. J., has 13 or 14 contracts and is employing about 5000 men.

"The Fore River Shipbuilding Company, Quincy, Mass., has several contracts and is employing nearly 4000 men.

"William Cramp & Sons Ship & Engine Building Company, Philadelphia, Pa., has contracts for a half dozen or more merchant marine vessels and considerable government work and is employing practically 5000 men.

"The Marine Department of the Maryland Steel Company, at Sparrow's Point, Md., obtained the contract for the eight Hawaiian-American Line ships already referred to and the order is the largest ever placed with one American ship yard for similar vessels. The eight ships approximate 70,000 tons. The Maryland Steel Company also has orders for four other vessels and is employing over 2000 men.

"Practically all the other ship yards on the Atlantic coast have a considerable volume of work. The Staten Island Shipbuilding Company, for instance, has contracts for six or more vessels. John H. Dialogue & Son, Cam-

den, N. J., closed contracts for nine new vessels in 1912. The T. S. Marvel Shipbuilding Company, Newburgh, N. Y., secured five contracts, and the Harlan & Hollingsworth Corporation, Wilmington, Del., booked seven contracts.

Pacific Coast and Great Lakes Active

"On the Pacific coast the business greatly improved in 1912, though most of the vessels built there were of comparatively small size. Steamships can be built cheaper on the Atlantic seaboard and a number of the vessels referred to as being constructed in Eastern yards are for Pacific coast owners.

"Shipbuilding on the Great Lakes has shared in the betterment. The American Shipbuilding Company is understood to have orders for 14 or 15 vessels in the Cleveland and Lorain yards. The Toledo Shipbuilding Company received three or four orders, including some Welland Canal size steamers for the Atlantic coast. The Detroit Shipbuilding Company has just turned out the largest passenger vessel on the Great Lakes—the City of Detroit III. She is undoubtedly the largest side-wheel steamer in the world and remarkable in many ways aside from the luxuriousness of her appointments.

"The Great Lakes Engineering Works, Detroit, in 1912 secured six or more contracts for Welland Canal size steamers for Atlantic coast use and also has considerable other work.

"River boat building also showed considerable activity in 1912, one of the most noteworthy contracts having been secured by the James Rees & Sons Company, Pittsburgh, Pa., for boats to be used on the Amazon River and its tributaries. The Howard Ship Yard Company, Jeffersonville, Ind., secured contracts for two or three river boats, and other yards got one or more each.

"A noticeable feature which came to the front recently is the construction of commercial boats of small size for use on rivers and other inland waters, which are equipped with internal-combustion engines, and perhaps the most interesting order of this kind was secured by the Great Lakes Engineering Works, Detroit. This company got the contract to build a fleet of self-propelling steel barges to carry coal from mines in Alabama to New Orleans. The power plant for the first of these boats is now being tested. It consists of an internal-combustion engine with producer gas plant.

"The business of building schooners in the ship yards of Maine has been falling off year by year and, as far as I know, only two or three such vessels are under construction in these yards. Most of these schooners are used in carrying coal, but it has been found that coal can be carried cheaper in steam colliers of several thousand tons capacity.

Notable Engineering Developments

"Two important developments of late years in marine propulsion are being watched with great interest: 1. The development of the Diesel engine. 2. The combination of the steam turbine and the reduction gear. As to the first, several Diesel-engined vessels have been built in Europe and a noteworthy voyage was that of the *Evestone*, which recently crossed the Atlantic to Savannah, where she discharged her cargo, then proceeding to Norfolk, Va. She was inspected by a number of naval architects, marine engineers, navy officers and others interested and a special run was made for the visitors. The combination of turbine and reduction gear has been tested pretty thoroughly in comparatively small power, that is, up to 2000 or 3000 hp. The intention, of course, is to give a slow number of revolutions to the propeller. As yet only one Diesel-engined vessel has been built in the United States and that was an oil barge for the Standard Oil Company. The engine was built and installed by the New London Ship & Engine Building Company, Groton, Conn.

Terminal Improvements Projected

"A branch of engineering in connection with the operation of steamships which is developing rapidly is that of the economical handling of freight by using modern appliances and equipment, and another great subject is the matter of terminals. At present plans are being formulated for a steamship terminal in New York Harbor on which will be spent \$8,000,000 if the plans are carried to fruition, and it follows that the facilities will include the latest equipment for handling freight at the lowest cost per ton. At Philadelphia it is planned to spend between \$4,000,000 and \$5,000,000 in a similar way, while terminal improvements are being considered in practically every harbor on both Atlantic and Pacific coasts. Boston already has appropriated \$9,000,000 for harbor improvements; New London, \$2,000,000, while at Providence, R. I., new piers are being built with money jointly appropriated by the city and State. Among other cities which have made appropriations or are considering action are Baltimore, Norfolk, Charleston, Pensacola and New Orleans. On the Pacific coast Seattle, Tacoma, San Francisco and other cities are spending millions for new docking facilities and freight handling equipment. Quite recently the treasurer of Hawaii was in New York, his mission being to dispose of a bond issue of several millions to be used for new docks in the harbor of Honolulu and the installation of the latest freight handling devices."

A New Steel Frame Rotary Shearing Machine

The Niagara Machine & Tool Works, 639 Northland avenue, Buffalo, N. Y., has recently added a new type of rotary shearing machine to its line of sheet metal working machines. This machine, which is designated by the builder as its No. 29 rotary shearing machine, is particularly intended for cutting irregular and reverse curves, but is also suitable for cutting disks and rings and for slitting metal along straight lines. The entire variety of work for which a rotary shearing machine can be used is thus taken care of and samples of the work turned out are shown in the accompanying engraving. Curves and disks down to a minimum radius of $1\frac{1}{4}$ in. can be cut with the machine and if the circle attachment is applied, it is possible to cut disks and rings ranging from 3 to 60 in. in diameter from a square blank.

The upper cutter is fastened to the end of a vertical shaft journaled in a turret, which can be swung to the side to permit the removal of the cutter for regrinding. The whole combination of turret, shaft and upper cutter

can be raised and lowered by a screw and handwheel. The lower cutter is mounted on the end of an inclined shaft. The machine has a variable speed gear drive, allowing for three different cutting speeds. Two pairs of bevel gears connect the cutter shafts with two horizontal shafts that in turn are driven through spur gears from the pulley shaft. A jaw clutch actuated by a foot treadle enables the operator to start and stop the machine at will. If desired, the machine can also be operated by a handwheel, this arrangement being recommended in cutting difficult shapes or sharp corners when it is necessary to reverse the cutters.

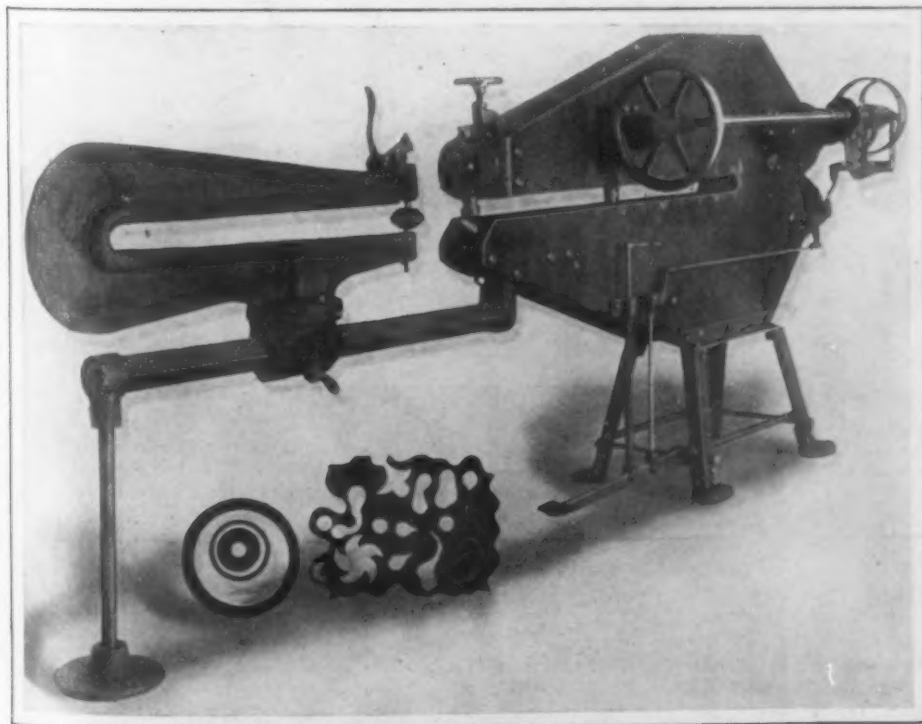
In cutting irregular curves, the shapes are scribed on the sheet and fed through the cutters, the sheet being guided in its passage by the operator. As both cutters are driven, the material is self-feeding and very little effort is required to follow the cutting line. The construction of the cutting head is such that the view which the operator has of the cutting line is unobstructed. The metal leaves the machine with a clean cut edge and practically without burr.

These machines are built in a number of different sizes for handling the various thicknesses of metal. The maximum capacity of the one illustrated, which has a throat 60 in. deep, is No. 12 gauge soft sheet steel.

A Dodge Safety Device

The Dodge Mfg. Company, Mishawaka, Ind., having been called upon to furnish a safety device to guard against accidents to employees engaged in operating rolls in rubber working factories, solved the problem effectually. The engineers of the company devised an arrangement by which a Dodge split friction clutch is used on the line shaft supplying power to the machines and is placed under the control of the roll operator by means of a strong cord. The clutch is instantly disengaged by the operator if he finds one of his hands being drawn between the rolls. The mechanism required between the cord and the clutch called for the exercise of much engineering ingenuity. The device has been so successful in its operation at the factory of the Mishawaka Woolen Mfg. Company that it has been adopted by the Rubber Regenerator Company, also of Mishawaka. Photographs of the device were exhibited at the recent Conservation Congress at Indianapolis and received much favorable comment.

The Metal Stampings Corporation, Streator, Ill., has been organized under the laws of Illinois, with a paid-up capital stock of \$60,000, and has purchased from the receivers of the bankrupt Streator Metal Stamping Company the assets of that company, including the plant, bank accounts, patents and good will. The new company will manufacture metal carpet sweepers, baby go-carts, music stands and general metal stampings. The officers of the company are as follows: C. Arthur Bruce, president; Paul R. Chubbuck, vice-president and treasurer; W. E. Philips, secretary and factory manager. Mr. Bruce is one of the officers of the A. O. Smith Company, Milwaukee. Mr. Chubbuck had been previously connected with the Streator Motor Car Company. Mr. Philips has been superintendent of the Stevens-Adams Mfg. Company, Aurora, Ill.



The New No. 29 Steel Frame Rotary Shearing Machine Built by the Niagara Machine & Tool Works, Buffalo, N. Y.

The Kaufman Lighting System

A system of lighting by means of lamps which vaporize kerosene oil has been introduced by the A. G. Kaufman Mfg. Company, 83 Reade street, New York. The method of illuminating was invented by a Belgian, whose patents have been acquired by the company named, and A. G. Kaufman has improved the lamp by giving it very desirable elements of simplicity and durability. The Kaufman lamp, as it is now known, uses a mantle. The oil is fed to the lamp under air pressure. An illustration of one style of the lamp is given in Fig. 1. This lamp is 28 in. long and the reflector is 18 in. in diameter.

The method of operation is by pumping the oil into a steel tank made to withstand 10 times the pressure required. The air pressure forces the oil from the tank through a small bronze tube, which is very flexible and

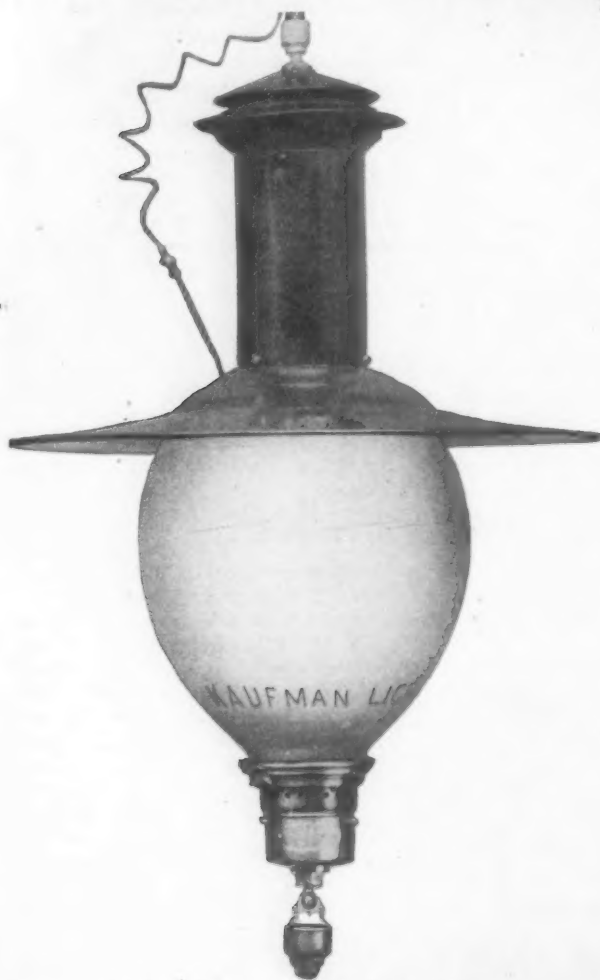


Fig. 1—One Style of the Kaufman Lamp

can be fastened on the ceiling or walls, run underground or strung on poles, and if necessary carried for long distances. The manner in which the tube connects with the lamp is shown at the top of Fig. 1. A number of lamps located at various points can be supplied from one tank. The tank is provided with an automatic check and safety valve which in case of fire in the building releases the pressure and all the oil in the tubing is then drawn back into the tank. Should the tank be directly exposed to the fire the oil will burn out in a vertical flame, and it is claimed that explosion is absolutely impossible.

The air pressure from the tank forces the oil through the tubing into the vaporizer at the bottom of the lamp. A little time is required, possibly two minutes, to start the lamp. This is done by pouring a small quantity of denatured alcohol in the vaporizer and lighting it, so as to

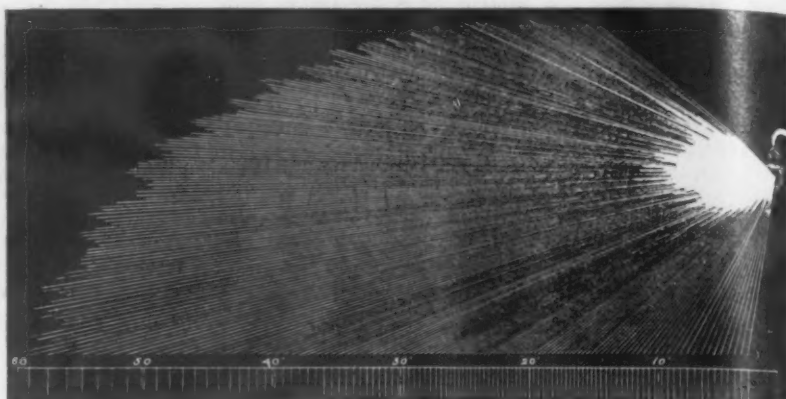


Fig. 2—Rays of a Kaufman Light Using One Mantle

secure the necessary heat to gasify the kerosene. Considerably less time is required in this operation if a plumber's torch is used for heating the vaporizer. The gas thus formed is burned under a strong mantle, creating a light of intense purity and brilliancy. This light has great penetrating power and diagrams, Figs. 2 and 3, given herewith, show the density of the light rays and the carrying power as obtained by a photometric laboratory test of a Kaufman light, having a reading of 1220 candlepower, compared with 785 candlepower of electric arc lamp.

The light does not flicker, but burns with a steady flame, and is unaffected by wind or a draft which would be liable to extinguish gas or ordinary vapor lamps. Its great brilliancy enables it to penetrate dust and fumes, such as are encountered in foundries, especially while pouring metal into molds. It is thus especially well adapted for general factory use. It has also been found very effective in outdoor lighting. Mr. Kaufman, who has just returned from a tour of the world in which he introduced the lamp in a number of countries, states that it is used in France and Germany for lighting railroad stations outside of cities, having proved much better suited for that purpose than the oil lamps and other kinds of lighting previously employed. He states that the city of Philadelphia has under consideration the substitution of this lamp for about 20,000 gasoline lamps which are now being used in outlying districts, and are becoming increasingly expensive because of the rapidly advancing cost of gasoline. Based on the current price of kerosene oil, a Kaufman lamp producing 1200 candlepower is stated to cost about $\frac{1}{2}$ ¢ per hour, which is much below the cost of maintenance of usual lighting systems.

The vaporizer used in this lamp is made of tungsten steel, nickel, silver and bronze, and while guaranteed for 10 years is almost indestructible. It can be removed from the lamp and cleaned in less than two minutes. A gallon of kerosene will burn 14 hours giving 1200 candlepower and 18 hours giving 1000 candlepower. The light can be regulated like city gas. It is made in a variety of styles for indoor and outdoor use. A contractor's lamp for

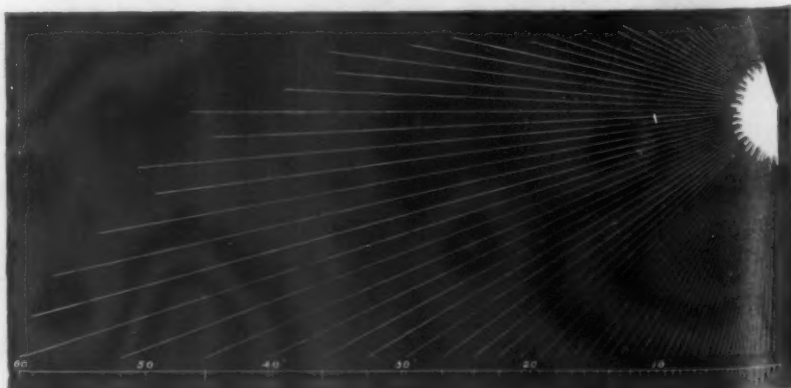


Fig. 3—Rays of a Standard Electric Arc Lamp

outlet use is an independent lighting plant in itself, having a stand made of tubing with a pressure tank at the foot and the light suspended from a hook at the top of the tubing. One form of lamp designed for portable

purposes has a small annular tank above the reflector, the whole outfit in this form weighing about 22 lb., and being easily detached from one location and carried to another as required.

To Make Molding Machines Most Effective

Suggestions Growing Out of Experience—Ample Room Is a First Consideration in Machine Operation and System Is Highly Important

—BY H. W. LENGFELDER*

It is well to consider carefully the innovations proposed for the foundry and to measure their value in its successful operation before accepting them as panaceas for existing evils. Naturally molding machines come up prominently in this connection. The writer would say at the very outset that he is a strong advocate of molding machines. He has patented and has been largely instrumental in developing such machinery. The experience gained from experiment along these lines has convinced him of the correctness of contentions which are at variance with the position taken by some.

Of the smaller type machines, those taking care of the bench work, nothing will be said, as there are numerous machines which will do the work suited for them admirably. Suffice it to say that there is still room for improvement in details, such as pattern-making and flask equipment. It is the larger type machines, those taking care of floor work, to which attention is being directed, primarily the jarring machine.

In molding there are several operations, which though done consecutively, are foreign to one another: viz., filling sand in the flask, ramming sand, drawing pattern, closing mold. The jarring machine takes care of the ramming of the sand. The value of this machine as it is generally used to-day increases proportionately with the increased size of the flasks it handles, and for reasons following there is little economy in placing a number of smaller flasks on the jarring table to be rammed.

Room for Serving the Machine Is of First Importance

Usually a foundryman is led to believe, in purchasing a jarring machine, or any other machine, that all he needs in addition to the machine are some flasks and patterns mounted on suitable boards or plates. Having these, his troubles begin. One of the most important problems confronting him is the proper location of the machine. It certainly should not be in one corner of the shop, where men, sand and equipment are all in a crowded floor space, each in the other's way. The location must be such that there can be free and easy access to the sand heap, which should be in close proximity to the machine, so that the rammed mold will occupy the space vacated by the sand used to fill previous molds. Such an arrangement permits of gang work and continuity in system, thereby keeping the help steadily busy, so there will be little or no interruption. This condition demands above all rapid methods of bringing the molds to and from the machine. And right here I want to emphasize this fact. The value and output depend largely upon the equipment in use for transporting the molds to and from the machine, together with sufficient floor space for setting out the finished molds.

Suggested Improvements for Jarring Machines

The builders of jarring machines might well pay more attention to this aspect of the work. They could give their business a decided impetus if they would develop together with their machines suitable appliances for the rapid handling of the molds. I am not finding fault with their efforts. Credit is due them for all they have accomplished, but I want to point out the way for greater usefulness. The builders of the gravity machine have recognized the value of this part of the operation in molding,

for they equipped their machine with two quick-acting jib cranes to handle its output.

In the case of the jarring machine, the drawing of patterns presents another serious problem. We find much time lost and poor results obtained by depending on hand or crane to draw the pattern. Much of the time gained in ramming is lost by a poor draw. A great saving is only effected when the entire work pertaining to molding is reduced to a system, where each integral part in no wise interferes with the continuous process, so that there is no delay by one part of the operation waiting upon another. This is an ideal condition, yet I believe it is not impossible of realization.

Such an arrangement demands above all sufficient floor space, a large part of which no doubt will be considered dead space in so far as it cannot be utilized to hold finished molds ready to receive metal, and will therefore be objected to by many. Nevertheless, it will pay better in the long run than congesting things, and will open possibilities little dreamed of in the foundry to-day. The reason is that nearly all of the work in connection with the production of molds can be done by unskilled labor, and entirely new organizations can be built up in a very short time. It places the foundryman in a position where he can conduct his business as he sees fit, without first sounding a shop committee to get its consent on methods of operation.

Lines of Future Progress

Too often we hold minor objections so close to our eyes that they obscure the larger possibilities. Our economies run in the wrong direction. We spend a considerable sum for a machine and then strive to get good returns with inferior, cheap equipment. We see only one aspect of the problem and then wonder why the results do not come up to our expectations. In most cases the answer is easily found.

What has been accomplished has been rather forced upon the manufacturer by the attitude of labor; for this reason progress has been somewhat slow. The future and final development must be the result of the direct initiative, brains, energy and experience of the foundryman rather than a defense against further encroachments.

The writer has purposely refrained from touching upon quality of ram, pattern mounting, flask equipment and some other problems. Experience has taught a few fundamental principles that must be recognized and applied in the eventual success of the jarring machine, and these may be mentioned in conclusion:

1. Overhead traveling cranes, unless supplemented with smaller quick-acting traveling jibs, or with suitable car service, are not sufficient for a continuous operation and the system becomes more or less congested.
2. Any method or device in drawing of the pattern must have the pattern and pattern plate so constructed that it is—or becomes during the drawing operation, at least—a permanent part of the mechanism. Such an arrangement demands rigidity for the pattern plate, also a suitable adjustment (leveling device) to take care of any irregularities in the line of the bottom board and insure a perfect draw. This does not necessarily mean complicated arrangements; simplicity is desirable in every respect. We should forget the elaboration that is so common and get closer home by applying simple methods and sound common sense.

*Assistant Superintendent Modern Foundry Company, Oakley, Cincinnati, Ohio.

Management Factors Other than Labor

Well Regulated Purchasing, Maintenance, Accounting and Other Departments as Essentials to Profitable Factory Output

Frederick A. Waldron, industrial engineer, New York, who read a paper entitled "Factors of Scientific Management Other Than Labor" at the January meeting of the New York members of the American Society of Mechanical Engineers, opened his subject with the statement: "The immense amount of literature that has been published in the last few years on scientific management has dwelt largely if not almost entirely with the labor problem; discussing and analyzing various methods of rewarding labor in order to obtain increased output, while the other elements which tend so much toward the maintaining of factory output have been to a large extent ignored."

Mr. Waldron then asked: "Of what avail would time, study and high-speed machines be if the proper materials were lacking? How efficient would micro-photographic work be if the store room did not have an efficient supply of finished parts on hand to assemble the machines? Of what avail would be the most elaborate system of time study if it was costing more to manufacture than the goods would sell for? In fact, what would any of this be worth if your business could not be obtained and the funds also, whereby the pay-roll and bills for labor and materials be met or a demand and use created for the output?" He continued:

Need of Closer Departmental Co-operation

There has been more or less tendency, in the management of industries, to divorce the financial and sales organizations from the factory or shop management in such an arbitrary manner that the two act in a way indicating that each is working for itself regardless of the broader interests of the company of which each is a part. So long as the sales end can get orders to the factory and get credit for such orders, the fact as to whether this order contains enough specific information to complete is ignored and it is left for the factory to make it out and guess at it. A most serious loss in volume of output is or may be caused by this. All orders before being turned into the factory should be complete and specific as to what is required. By this is meant completeness and not abridged completeness.

I can recall in several instances in my experience where an output of from \$50,000 to \$100,000 of business was held awaiting detailed information on minor items before the order could be shipped. Two men at a salary of \$1,500 per year apiece would have rounded up this information in ample time to allow of the prompt shipments of these orders. Keep your entire organization in balance. Don't overload sale and advertising departments if the factory cannot handle the work. Build up on a solid foundation surely and gradually. Educate, not in factory alone, but along the entire line.

Quality of Output Needs Watching

In the excitement of the moment, the fact of quality of output should not be lost sight of. The supremacy of the American manufacturer in the market of the world is today an established fact, especially in the mechanical field. If this is to be maintained, it behooves us to jealously guard that which has placed us in the lead. The quality of work should be watched closely and improved at every point, as the European manufacturer is slowly creeping up the ladder and, in some instances, has already passed us in this respect. The quality cannot be maintained by the mere placing of tools, instructions and drawings in the hands of the workman. This man must be trained and it takes time and money to train him and unless this training embodies the elements of thoroughness and completeness, the workman becomes a half-rate slipshod man, looking for pay day and taking little if any interest in his work.

Every green workman broken in means sacrifice in profits, quality and volume of output. Therefore, ideal

factory conditions rest almost entirely on one basic principle which is, Constant Volume of Output. It is not always possible to maintain this owing to conditions which may arise, such as the matter of orders, capital, and the proper supply of materials and help. We should, however, try as these weak points develop to build them up in such a way as to make conditions tending toward constant volume of output as nearly perfect as possible. It is far better to work at a steady, even gait for a year than to intensify production to a point where all the work is done in six months and your factory is idle for the remaining six months. Intensification in output often depends on matters entirely extraneous to the labor problem and factory management. In other words, the business and factory ends of our enterprises require a synchronizing or bringing in step so that each is working in harmony with the other, tending towards maximum economic conditions and profit.

The extent to which time study should be carried depends entirely on these conditions, and the expense incurred by ultra-reinforcement could better be invested, oftentimes, in raw materials or finished stock of proper quality. It is the province of the industrial and efficiency engineer to help guide the manufacturer as to how far he should go in a question of this kind. A factory with an undersold output is no place for a premium or bonus system. Accurate and simple accounting and routing are requisites here. With an oversold output, a premium, bonus or piece rate system, based on accurate time study, combined with accurate and simple accounting and routing, is necessary to produce the maximum efficiency on the shop end, combined with a purchasing, inspection and stock department that can keep pace with a well developed shop organization.

Importance of Purchasing Department Methods

The most effective co-operation between the factory and purchasing department is as essential as time study or production engineering work. Of what avail is time study and intensified production if the purchasing agent buys materials at the lowest price that will not meet the requirements of the product in quality? The answer is simple, work is thrown away before it is assembled, or if sent out in the finished product it will react on business, in time to a fatal degree. The answer is to buy to specifications and see that you get the material before it is needed and that the specifications are conformed to. Serious delays and expenses are oftentimes caused by improper specifications for simple materials and supplies. The lack of this information on requisitions made by superintendents, foremen and clerks on the purchasing department is a current trouble in many factories. This can be obviated by a symbol or number system which ties all materials used in the factory to a standard specification which is definite and complete in its working. Requisitions on the purchasing agent, reading as follows, should be avoided: "Same as last order;" "Seventeen 1/2-in. screws;" "20 ft. of lumber;" "50 gal. of oil;" "100 lb. of steel." These are samples of requisitions which should be studiously avoided. They are mere signs indicating that the individual wants something. What is wanted, however, is left to the purchasing department to find out. This requires time, money and causes oftentimes serious delay. Low prices paid for materials are not necessarily exponents of a purchasing agent's efficiency. The man who can discriminate and buy the right thing at a fair price is the kind of man that lasts, in this period of competition and exacting requirements.

Functions of Engineering Department

A product improperly designed and well made cannot maintain its place in this market and, conversely, a product properly designed and improperly made cannot be sold. To properly design and see that it is properly

made in the measure of efficiency in the engineering department. Proper strength, lines, proportions, tolerations, inspection, instructions, manufacturing specifications, tool design and manufacturing should be done in this department and done thoroughly. Time study and bonus system are thrown away if done on work that cannot be used, or hurts your trade. Further, responsibility is more readily placed if this is done in the full sense and meaning of the word "complete." This division is really, in the modern organization of high efficiency, the most important of all as it is the fountain head from which all specifications are issued, designs made and quality of work determined.

To assure proper materials being given to the workmen is the first and most important duty required, following by proper tools, condition of machines, jigs and fixtures, to assure reasonable performance of acceptable work. The above functions are just as necessary to perfect work as time study or bonus, for without these the intensified production would be lacking, owing to the fact that conditions for perfecting the work would not be constant and the failure to perfect such work would be beyond the workman's control. This division, having brought up the above requirements to the proper standard of efficiency, has now a hold or control of the quality of the work as specified by the engineering division and is in a position to insist on its quality being maintained.

Many Conditions Beyond Employees' Control

There are some fifty or more reasons why a workman cannot do a full day's work, all of which are beyond his control and properly up to the management. An engineer cannot make his running time if his locomotive lacks proper grates or steam capacity or is in bad repair. Neither can a workman make his time unless he has proper light, heat, power machines, tools and fixtures, etc., in proper working condition. One of the most common troubles is the condition of belts, long ago recognized by Frederick W. Taylor and covered in his paper on "Shop Management." His system, with the belt, bench and scales, in a factory using many belts, is the best obtainable and shows direct results in volume of output and saving in belt bills. Countershafts, main shafts, jack shafts, motors, machine repairs should receive a systematic supervision to insure constant and efficient operation. True, time study develops these requirements, but they should be attended to first, or time study will, in a way, be wasted, unless conditions of operation are reasonably constant.

To have reasonably accurate costs is not only desirable but necessary, not only as a means of efficiency, but also to eliminate unprofitable articles of manufacture and produce the more profitable ones. To have this system requires methods of factory accounting which interlock with routing system, time keeping and stores, requiring a close co-operation with the stores, production and producing work of management. Proper distribution of overhead charges, accurate time study and charges, accurate material charges, controlled from a central point in which all is charged against its proper account by the same mental interpretation is the only accurate way, combined with a symbol method, not too complicated, which places the burdens where they belong at the time the expense is incurred.

Graveyard a Good Object Lesson

Unless raw and worked materials are properly accounted for it is impossible to tell "where you are at," so that the truthful conduct of a stock room is another important and necessary function outside of the workman. Stores records should be complete and show enough information to gage efficiency without being so complicated and cumbersome as to require more time to tell the story than an inventory. Maximums and minimums should be so proportioned as to allow a minimum amount of capital being tied up in fixtures, stock, raw materials and work in process as well as all materials spoiled or defective. A graveyard in a store in plain sight of all is a mighty good object lesson to management and workmen. The broad or commercial interpretation of efficiency engineering, scientific management, is profitable management in which the finer measure of success is the return on the investment. As this return is dependent on other than labor elements it would seem but fair that we carefully and earnestly consider the fact that no man can do efficient work at a ma-

chine unless the conditions are made right for the performance of such work and that each function of the industrial organization requires as close attention, if not more, than that which refers directly to the reward of labor.

New Steel Warehouses to Use Chicago River

Having completed the steel skeleton for their new warehouses now being erected on four acres of property abutting on the north branch of the Chicago River, A. M. Castle & Co., iron and steel jobbers, are preparing for the larger service their new facilities will enable them to render. The present construction includes an office building and sheet warehouse, 120 x 160 ft., and a structural and plate warehouse, 160 x 262 ft., this latter building being the first of several units embraced in the plan. The ground floor of the office building will be used for sheet storage. The general warehouses are to be erected parallel to the present unit, the long axis of which is at right angles to the river with the receiving end of the building next to the river.

This unique warehousing arrangement has for its particular object the handling of incoming carload shipments direct to the plant by barge. The Chicago Lighterage Company, which is already transshipping car freight to river points, is equipped to handle eight cars on a single barge. The transfer of lake freight by barge is likewise readily handled. On the receiving dock for the new warehouses two 40-ft. boom cranes are to be rigged for the transfer of the material direct from the barges into the receiving end of the warehouse. These transfer and handling facilities make it possible to take advantage of the cheaper lake shipment of steel from Eastern points and at the same time the constantly increasing congestion of the Chicago switching district is avoided. In addition to the above facilities the railroad connections to the warehouse include a receiving spur, entering at one end of the building, and a shipping spur at the opposite end, each entirely independent of the other and branching from independent feeders.

The warehouse is laid out with two longitudinal bays each 80 ft. wide, one for the storage of structural shapes and the other for plates. Each bay is traversed by overhead cranes. A narrow mezzanine floor, 192 ft. long, will be erected in the plate bay along the wall, and on this all rivets will be stored. Below this floor the tubes will be stocked in racks. They will be handled to the shipping platform in a cradle carried from a mono-rail trolley hung from the mezzanine floor beams. It is the expectation that the new buildings will be in service before the end of March.

Hydroelectric Power for Through Traffic

Electrification of a division of the through transcontinental service on the Puget Sound extension of the Chicago, Milwaukee & St. Paul Railroad has been made possible by the issuance of a grant from the Department of the Interior to the Great Falls (Mont.) Power Company to transmit over public domain under government regulations, the necessary current. As distinguished from terminal and suburban electrification, this is the first through traffic division to be so operated and it points to the large utilization of water power in the reduction of railroad operating costs. The division to be electrified covers a distance of 440 miles from Harlowtown, Mont., to Avery, Idaho, and it extends over three mountain ranges. The cost of construction will approximate \$5,000,000. Contracts for material and equipment are being let and construction work will be started within two years.

Concerning the grant Secretary Fisher of the Department of the Interior says: "The fact that the Great Falls company was willing to accept the fullest provisions for the protection of public interests, even where all it was asking was for a transmission line, is of even greater importance from the public benefit point of view than the further great electrification of railroads which must follow."

The annual report of the New York Metal Exchange, containing statistics for 1912, compiled by Secretary C. Mayer, was issued last week.

Crystalline Growth of Strained Ferrite*

Investigation of Condition Resulting in Brittleness in Working or Deforming Metals

— BY ALBERT SAUVEUR † —

In 1898 Stead in a now classical paper called the attention of metallurgists to the spontaneous growth of strained ferrite grains when exposed to temperatures close to but below the thermal critical range of the metal. Since Stead's writing little additional information of value has been obtained or at least published concerning this interesting and commercially important occurrence.

The author has had conducted in his laboratory a considerable number of experiments with a view to securing additional data regarding the mechanism of this crystalline growth, the influence exerted upon it by the annealing temperature, the period of annealing, the character and intensity of the strain, the presence of carbon, of slag,

malized bars were subjected to stresses of various kinds and of varying intensity and then to annealing, generally at 650 deg. C. for 7 hr.

In Fig. 1 are shown the results obtained in the case of a piece of this steel subjected to the Brinell ball test under a pressure of 6000 kg. followed by annealing for 7 hr. at 650 deg. C. and slow cooling in the furnace. The structure shown is that of a vertical section passing through the bottom of the spherical depression caused by a 10 mm. steel ball. It will be obvious that the strain was most severe at A, at the very bottom of the depression, and that it decreased gradually in intensity from A to D.

The following features of the structure should be



Fig. 1—Steel Containing 0.05 Per Cent. Carbon, Subjected to Ball Test Under Pressure of 600 Kg. and Annealed at 650 Deg. C. for 7 Hr. Vertical Section Through Bottom of Depression

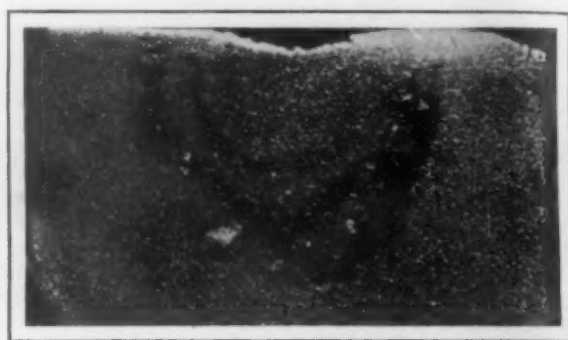


Fig. 2—Same Steel, Subjected to Ball Test Under Pressure of 3000 Kg. and Annealed at 650 Deg. C. for 7 Hr. Vertical Section Through Bottom of Depression

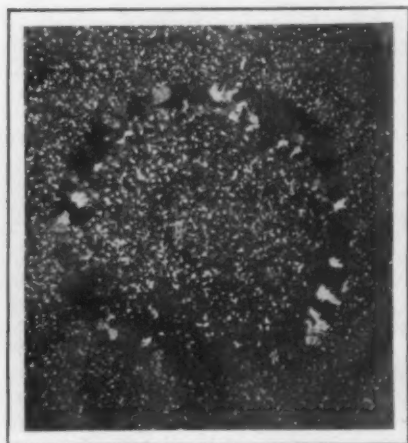


Fig. 3—Same Steel Tested and Treated as Indicated Under Fig. 2. Horizontal Section Through Bottom of Depression

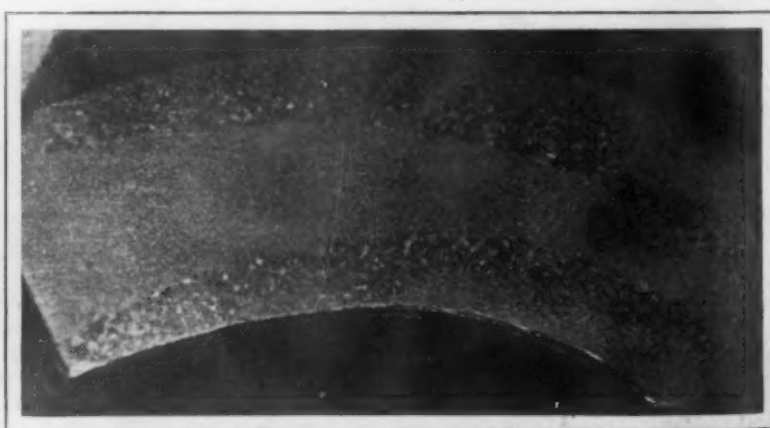


Fig. 5—Same Steel, Bent Double and Annealed at 650 Deg. C. for 7 Hr. Longitudinal Section Through Center of Bar Near Bend

etc. The author will confine himself to a brief résumé of the most significant results obtained.

The experiments were all conducted with bars $\frac{1}{2}$ in. square made of steel containing 0.05 per cent. carbon and otherwise of good commercial quality. As a preliminary treatment all bars were heated to 1000 deg. C. in a gas furnace and allowed to cool slowly with the furnace. For convenience of speech this treatment will be referred to as "normalizing." Its purpose was to remove any existing strains and to impart to the steel a well developed structure made up of equi-axet ferrite grains and scattered pearlite particles. Specimens cut from these nor-

noted as having special significance: (1) At D where the metal was but slightly if at all strained no crystalline growth occurred, (2) at C where the strain must have been more severe a sudden growth of maximum intensity took place, (3) from C to B as the severity of the strain increased the crystalline growth showed a gradual decrease, and (4) from B to A, that is, with further increase of the intensity of the strain no crystalline growth took place. These observations point to the conclusion that ferrite grains will not grow on annealing below the critical range unless they have been subjected to a certain stress. In other words they point to the existence of a critical strain producing growth, strains of greater or less magnitude being ineffective. The narrow region occupied by the critically strained metal should also be noted as well as the very sharp line of demarcation be-

*Paper substantially in full, read before the International Congress for Testing Materials, New York.

†Professor of Metallurgy and Metallography in Harvard University, Cambridge, Mass.

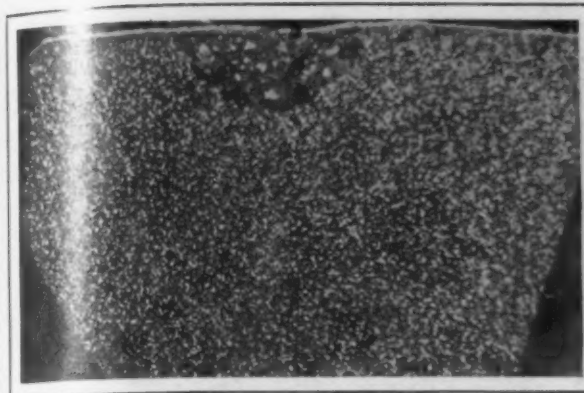


Fig. 4—Same Steel, Subjected to Ball Test Under a Pressure of 1000 Kg. and Annealed at 650 Deg. C. for 7 Hr. Vertical Section Through Bottom of Depression

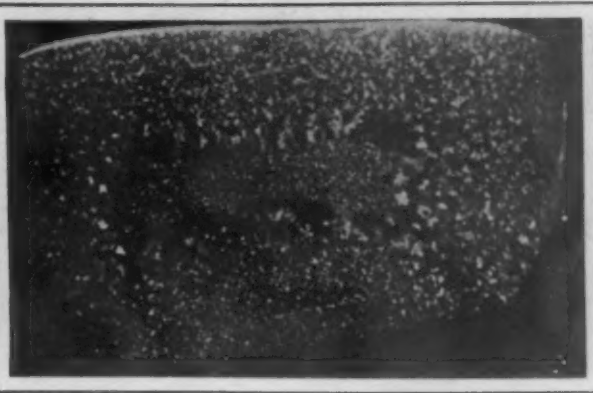


Fig. 8—Same Steel, Twisted and Annealed at 650 Deg. C. for 7 Hr. Transverse Section of Bar

tween the critically strained and the under-strained metal. The separation of the critically strained metal from the over-strained is not so sharp. Similar experiments were repeated many times and like results always obtained.

A piece of the same steel was subjected to exactly the same treatment except that the ball pressure used was 3000 kg. or half the pressure applied to the previous one. The crystalline growth resulting from the annealing of this sample is shown in Fig. 2. Because of the smaller stress applied the critically strained portion of the metal is nearer the depression. This would naturally be expected. Here as in the previous case we have three distinct regions: (1) The metal surrounding the depression and extending to a certain distance which was too severely strained to grow, (2) the critically strained metal in the form of a spherical shell, and (3) the rest of the metal unstrained or too feebly strained for the growth to take place. Fig. 3 is a section through a similar sample, the specimen having been ground level with the bottom of the depression. The occurrence in this section of a ring showing crystalline growth will be readily understood.

Another piece of the same steel was subjected to the ball test under a pressure of 1000 kg. and annealed. The resulting structure is shown in Fig. 4. Because of the light pressure exerted the critically strained portion reaches the very bottom of the depression and surrounds it, there being no over-strained metal. The rest of the sample was under-strained.

In Fig. 5 is shown the structure of a bar of the same steel which, after having been completely bent, was subjected to annealing (7 hr. at 650 deg. C.). A piece of this bar was then cut and a longitudinal section through its center prepared for microscopical examination. It will be obvious that the upper part of the bent portion of the bar was subjected to severe tension while the lower part of the bend was subjected to severe compression. Some-

where between the upper and lower parts a neutral plane existed which was subjected neither to tension nor to compression, and in the vicinity of this plane the metal was but slightly strained. Moving in both directions from this neutral plane the metal becomes gradually more severely strained. Fig. 5 shows that (1) in the center of the bar no growth took place, the metal being here under-strained, (2) as soon as the critically strained portion is reached a very abrupt growth occurs of maximum intensity, and (3) this growth decreases gradually as the metal becomes more severely strained, being very slight if existing at all where the strain was maximum, that is, near the upper and lower parts of the bend. The widening of the central portion showing no growth as the distance from the bend increases is also consistent with the existence of a critical strain, for it is evident that the portion of unstrained or under-strained metal increases with that distance. Incidentally this experiment shows that tension is apparently as effective as compression in producing crystalline growth, there being apparently no difference in the size of the ferrite grains between the upper and lower parts of the bar. The critically strained portions occupy also nearly the same position with regard to the outside surfaces, that is, they occur at the same depth. Their width also appears to be the same.

Fig. 6 shows the structure of a transverse section of the same bar. To be noted: A central band of under-strained metal, two parallel bands of critically strained metal and two wide bands showing rapidly decreasing growth as the strain becomes more severe.

In Fig. 7 is seen the crystalline growth caused by shearing a bar. The section shown is a vertical one at right angles to the sheared surfaces AA. It will be seen that the critically strained portions of the metal lie at some distance from the sheared sides, and that they form two narrow bands, the metal on both sides of them having failed to grow, the central portion because under-

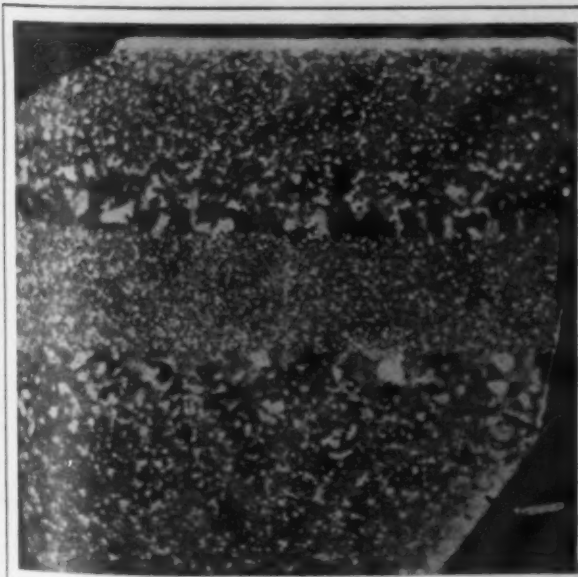


Fig. 6—Same Bar as Fig. 5. Transverse Section Near Bend

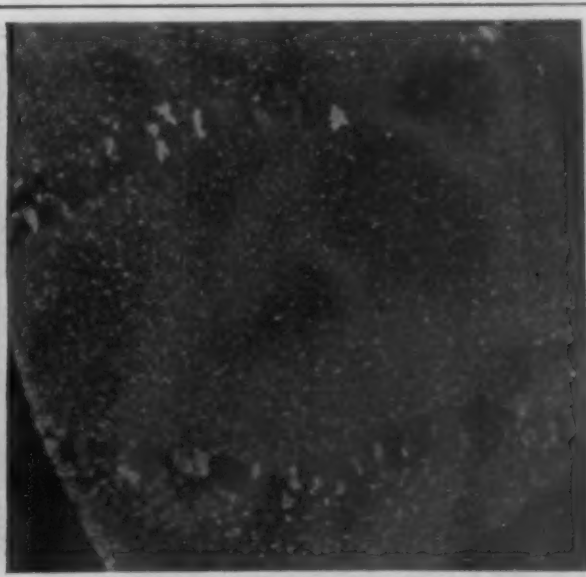


Fig. 7—Same Steel, Sheared and Annealed at 650 Deg. C. for 7 Hr. Vertical Section at Right Angles to Sheared Surfaces

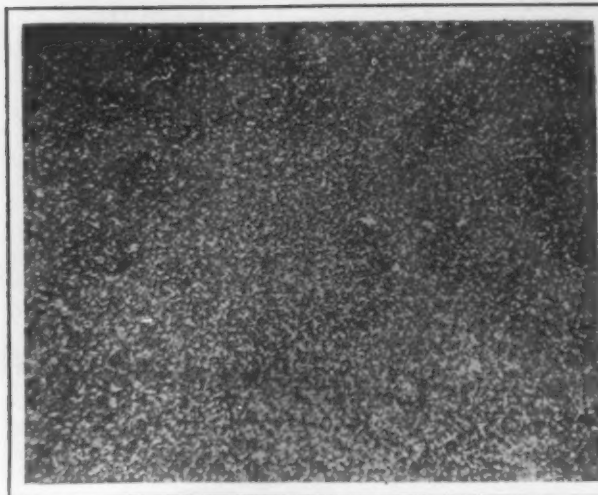


Fig. 9—Same Steel Subjected to Tension of 47,500 Lb. Per Sq. In. and Annealed at 650 Deg. C. for 7 Hr. Transverse Section of Bar

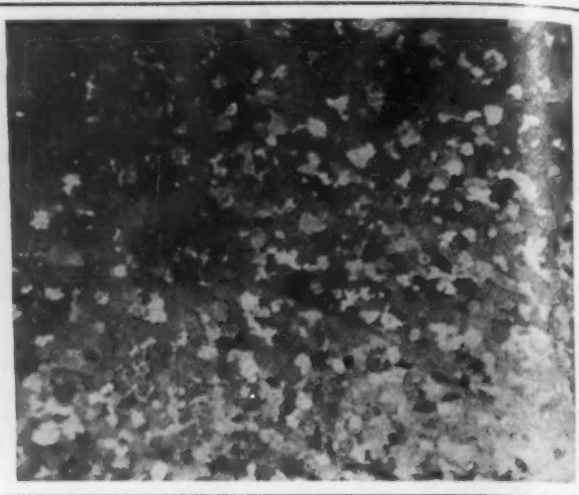


Fig. 10—Same Steel, Subjected to Tension of 50,000 Lb. Per Sq. In. and Annealed at 650 Deg. C. for 7 Hr. Transverse Section of Bar

strained, the outside portions because over-strained.

The growth resulting from a twisting stress is shown in Fig. 8, which reveals the structure of a cross section of a bar of the same steel twisted one full turn around its axis and then subjected to annealing. Here as demanded by our hypothesis we note a central portion which failed to grow because of being insufficiently strained, a narrow band of critically strained metal showing maximum growth and a surrounding zone more severely strained in which the growth rapidly diminishes.

From the above considerations it seems evident that in order to cause ferrite grains to grow on annealing below the critical range of the metal a certain critical stress must be applied creating a critical strain and that if this strain be exceeded no crystalline growth takes place. With a view of securing some data in regard to the magnitude of the critical stress needed to induce growth on annealing, a number of bars of the same steel were subjected to tensile stresses of increasing intensity, annealed at 650 deg. C. 7 hr., and in every case a cross section of the strained and annealed bar prepared for microscopical examination. The results are condensed below. The yield point of the metal was in the vicinity of 35,000 lb. per square inch, its ultimate strength 57,000 lb. per square inch.

Lbs. per sq. in.	Crystalline growth.
2,500	None.
5,000	"
10,000	"
25,000	"
37,500	"
40,000	"
45,000	"
47,500	"
50,000	Very marked
52,500	None.
55,000	"
57,000, (bar fractured).....	"

In Figs. 9, 10, 11 and 12 are shown the sections of the bars subjected, respectively, to stresses of 47,500, 50,000, 52,500 and 55,000 lb. per square inch and annealed.

These tensile tests afford another conclusive evidence of the existence of a critical strain and the fact that a stress of 50,000 lb. per square inch produces a marked growth while stresses but slightly inferior or superior, namely, 47,500 and 52,500 lb. per square inch, do not induce growth is an indication of the narrowness of the range of the critical stress. The critical tensile stress needed to produce a critical strain apparently exceeds by some 15,000 lb. per square inch the yield point of the metal.

Stead noticed that low-carbon steel sheets rolled below their critical range and, therefore, strained, often exhibited great brittleness after annealing below the range, undoubtedly because of crystalline growth. He also noticed, without being able to explain it, that relatively thick sheets only were so affected, namely those having a thickness greater than 18 B. W. G. It seems evident in the light of the results of the author's experiments that the thinner sheets having received more work the ferrite had been strained beyond the critical strain and consequently did not grow on annealing. Stead had a vision of such reversal in the action of the stress for he wrote, "What is the cause of this difference? Does the rolling continued beyond a certain point destroy the latent arrangement set up before that point is reached?"

The experiments described in the foregoing pages were performed by J. O. Connolly, at the time a student in the Graduate School of Applied Science of Harvard University, at present with the American Steel & Wire Company; the interesting results obtained are largely due to the skill and intelligence with which the manipulations were conducted.

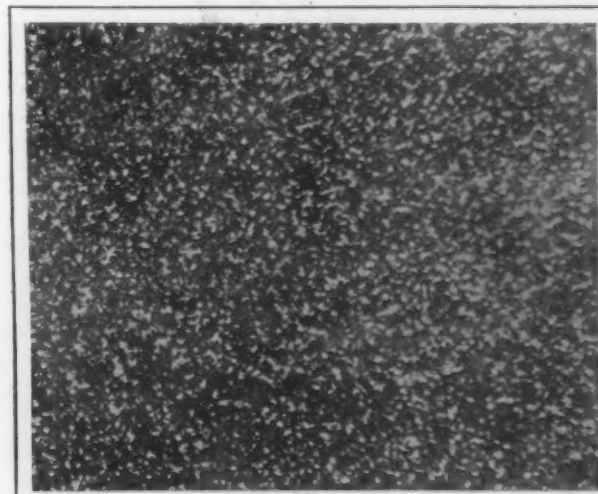


Fig. 11—Same Steel, Subjected to Tension of 52,500 Lb. Per Sq. In. and Annealed at 650 Deg. C. for 7 Hr. Transverse Section of Bar

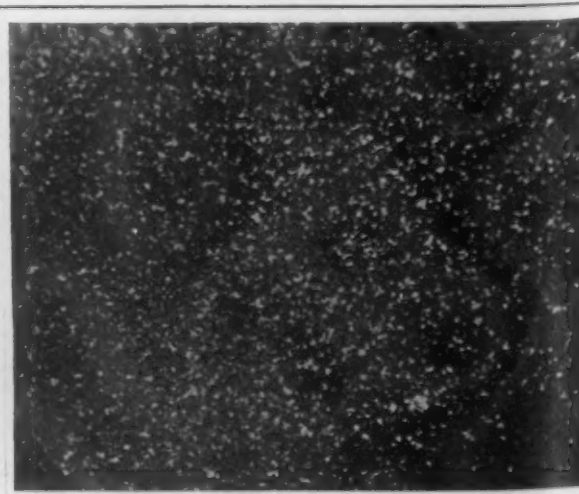


Fig. 12—Same Steel, Subjected to Tension of 55,000 Lb. Per Sq. In. and Annealed at 650 Deg. C. for 7 Hr. Transverse Section of Bar

Jobbers' Extras for Cutting to Length

It has hitherto been the practice of the iron and steel warehouses at Chicago to cut angles and plates to short lengths generally without additional charge. This accommodation has long been considered incongruous, in view of the regular mill card of extras for similar cutting, and during the last six months the pressure which the tremendously heavy buying from store has put upon warehouse facilities has accentuated the need for a regulation of cutting specifications in the interest of prompt deliveries to the trade in general. As indicated in the current market report from Chicago, the question of a schedule of extras which has had the consideration of the several jobbers at Chicago has crystallized and an announcement has been made by Joseph T. Ryerson & Son, for their warehouse, that effective February 1 a regular card of extras will be in force varying from \$2 to 20 cents. This card will not be subject to the usual price variations, but will be in every way similar to other regularly established extras.

It is apparent from the amount of the extras named, that they are not established as a source of revenue, but are based on costs and, in fact, are less than actual costs of cutting by an amount equivalent to that which is conceded in cutting lengths over 3 ft. It is expected that the extras will result in the transfer to the shops of steel users of considerable work properly belonging there, thus relieving the stores of a fabricating operation not properly a part of warehousing service.

New stock lists for plates will also present an innovation, reflecting a change whereby plates will be held in stock in standard widths only, with varying lengths, just as structural shapes are carried in standard sizes and varying lengths. For example, the stock lists will show 100 pieces of 24, 30, 36, 42, or 48-in. plate in lengths from 3 ft. to the maximum mill lengths rolled. In addition to the long plates, the commonly used sheared plates in standard sizes will be carried as at present.

A Rumely Company Tour of Inspection

The forty-four branch managers of the M. Rumely Company, LaPorte, Ind., with their "honor" salesmen, have just completed a week's trip to the seven plants where Rumely power farming machinery is built. The tour was conducted by the Rumely Company and was made in a special train. The factories visited included that at Stillwater, Minn., where gasoline tractors are built; the Falk Company works at Milwaukee, where the Rumely Oilturn stationary engine is built; that of the Grand Detour Plow Company, Dixon, Ill., whose output of plows, harrows, listers and other machinery has just been taken over by the Rumely Company; the Rumely plant at Battle Creek, Mich., formerly that of the Advance Thresher Company; the Seager Engine Works and the Omega Separator Company at Lansing, both of whose outputs are taken by the Rumely Company; what was the Gaar-Scott plant at Richmond, Ind.; that of Robinson & Co., of the same city, who build Rumely products, and finally the Oil Pull tractor works of the company at LaPorte. The itinerary is interesting as indicating the remarkable expansion of the Rumely Company in a period of less than two years.

The Oxweld Acetylene Company has opened a job welding and cutting department at its new works at Thirty-seventh street and Jasper place, in the central manufacturing district of Chicago. L. M. Malcher, for five years president of the Western Welding & Mfg. Company, will have charge of this department, which will be prepared to weld cracked or broken iron, steel and aluminum castings, defective forgings, fireboxes, tanks and boilers, machinery, automobile parts, etc.

The C. Pardee Works, Perth Amboy, N. J., manufacturer of steel billets, bars and shafting, states that the recent fire in its plant was confined to a small building in which machinery was housed for making very small sizes of shafting, constituting but a small part of the whole of the company's output and of the machines utilized in key-seating shafting. The shafting mill was not destroyed, as reported in the daily papers. The loss is placed at about \$15,000.

The Tata Iron & Steel Company, Ltd.

Visiting General Manager Tells of Progress at Plant in India

Robert G. Wells, general manager of the Tata Iron & Steel Company, Ltd., Kalimati (Bengal), India, the plant of which was described in *The Iron Age* of April 11, 1912, is in this country on a six months' vacation after 4 years in India and gives some interesting details of the operation of the enterprise. The data given by Mr. Wells indicate not only the success of the company but are promising for the future. Although he did not care to go into the cost of production specifically, he made the statement that pig iron is being produced at the Tata plant at a cost lower than attained elsewhere in the world. In the fiscal year ended June 30, 1912, the company with one furnace in blast earned and paid 6 per cent. on its preferred stock, as well as interest on its bonds, besides writing off a portion of its preliminary expense. Mr. Wells said:

"The first blast furnace was blown in December 2, 1911, and the second September 21, 1912. They have since been running steadily and are producing about 200 tons each of foundry or basic iron per day. The iron, both foundry and basic, is good in quality. It is low in sulphur and runs 0.30 to 0.35 per cent. phosphorus and 1¼ to 1½ per cent. manganese. The bulk of the pig iron is exported, principally to Japan, with some going to Australia, the Straits Settlements, Java, New Zealand and Manchuria. The output of pig iron is practically disposed of for 1913. The steel which has been produced up to the present has been practically all put into structural shapes for India and Japan, but within the first quarter of this year we expect to be turning out rails for the Government of India. Two of the four 40-ton basic open-hearth furnaces with which the plant is equipped have been placed in operation. The steel works and rolling mills began operations in February, 1912. The coke supply is furnished by 180 Copee non-by-product coke ovens, which make about 500 tons of coke per day, the product running about 20 per cent. ash and 0.6 sulphur. The ovens were started September 12, 1911. There are about 180 Europeans and Americans in the organization. The native labor is taking hold much better than was anticipated. The wages for native common labor are 7c. per day for coolie women, and 9c. per day for coolie men, while native machinists receive 25 to 40c. per day. Natives have qualified as foremen, but none as yet has advanced to more important positions."

In a copy of the directors' report for 1911-12, to which Mr. Wells directed attention, it is stated that a much larger proportion of the labor in blast furnace operation is in the hands of trained Indians than was thought possible at an early stage and the iron produced is commented on as of a very high grade that compares favorably with the best brands imported into India. The quality of steel produced, which so far has been used for rolling beams, channels and angles, conforms to the British standard specifications. The company's colliery at Bhelatand has been completed, and up to September 1, 1912, 50,000 tons of coal had been raised, the colliery furnishing all the steam coal and a portion of the gas coal required. To the plant as originally designed, the report points out, several additional items such as storage sheds for refractory materials, cast house annex, building for hot bed, etc., have been erected. The entire plant has been placed in operation with much less trouble than had been anticipated and the sale of products has been most satisfactory both as to prices and demand.

The sales of pig iron and steel to date, it is asserted by Mr. Wells, have demonstrated that in the field now served by his company there is ample demand for the entire production of the works. The company has a concessional freight rate of 3½ mills per ton-mile for the assemblage of raw material and also from the works to Calcutta on finished products which are destined for export. Mr. Wells has been staying at the Waldorf-Astoria, New York.

The general plan of the works of Dodge Brothers, Detroit, Mich., which has been the subject of articles in the issues of January 2 and January 9, was that of Dodge Brothers themselves, and the original buildings were designed and built by Albert Kahn. It was with some of the later buildings that Smith, Hinchman & Grylls, engineers and architects, Detroit, had to do.

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CONTENTS.

The Next Improvement in Steel Making.....	239
The Non-Metallic Impurities Found in Steel.....	240
New Blast Furnace of Maryland Steel Company.....	242
A Heavy Haul by a 6-Ton Truck.....	245
Selecting the Correct Machine for the Work.....	246
Efficiency Society Meets Next Week.....	247
Central Ore Sintering Plant at Buffalo.....	247
The Science and the Art of Management.....	248
Chilean Iron Ore for Bethlehem.....	249
A Small Face or Barrel Cam Cutting Machine.....	250
A New Double Opposed Corerom Sand Shaker.....	250
A Special Machine for Hobbing Automobile Gears.....	251
A Ripping Punch and Die.....	251
The Progress of Shipbuilding in 1912.....	252
A New Steel Frame Rotary Shearing Machine.....	253
A Dodge Safety Device.....	253
The Kaufman Lighting System.....	254
To Make Molding Machines Most Effective.....	255
Management Factors Other than Labor.....	256
New Steel Warehouses to Use Chicago River.....	257
Hydroelectric Power for Through Traffic.....	257
Crystalline Growth of Strained Ferrite.....	258
Jobbers' Extras for Cutting to Length.....	261
A Rumely Company Tour of Inspection.....	261
The Tata Iron & Steel Company, Ltd.....	261
Export Trade in Iron and Steel in 1912.....	262
Economy of a Works Hospital System.....	263
The Buying Agent and the Honest Salesman.....	263
Protection of Records in Reproduction.....	263
Closing German Factory Doors.....	264
Specifications for Steel for Forgings.....	264
Women in Ohio Shops and Factories.....	265
Rolling Mill and Bolt and Nut Works in Alberta.....	265
Agricultural Implement Exports in 1912.....	265
Garry Iron & Steel Company's Cleveland Offices.....	265
Iron and Metal Markets.....	266
Personal.....	278
Obituary.....	279
Red Mountain Ore in Shades Valley.....	279
The Steel Corporation Hearings.....	279
Pittsburgh and Vicinity Business Notes.....	279
Tariff Hearings at Washington.....	280
To Cure a Dusty Concrete Floor.....	280
The Concrete Industry's Use of Iron and Steel.....	281
Blast Furnace at Rusk, Texas, Now Leased.....	281
November Iron and Steel Exports and Imports.....	281
Axioms Concerning Manufacturing Costs.....	282
Book Reviews.....	285
The British Metal Market in 1912.....	286
Customs Decisions.....	286
Progress of Knox Water Cooled Ports and Doors.....	286
Horton and Morrow Chucks.....	287
Judicial Decisions of Interest to Manufacturers.....	287
The Machinery Markets.....	288
Trade Publications.....	296

Export Trade in Iron and Steel in 1912

We have referred from time to time to the comments of British trade journals on the unsatisfactory conditions of the iron and steel export trade of Great Britain. It is well known that the conditions of the world's iron trade in 1912 were exceptionally good. Much was said throughout the year in British newspapers, of the boom that was on in all industry, in spite of coal and railroad strikes there and the resulting interruption to manufacturing operations. While the iron industry suffered greatly from the coal strike, as indicated by an output of only 3,606,147 tons of pig iron in the first half of the year, or 1,000,000 tons less than in the second half of the preceding year, the second half of 1912 (for which pig iron statistics are not yet available) showed a marked expansion. Both the volume of trade in iron and steel and the prices realized were considered highly satisfactory.

Yet summing up British foreign trade in iron and steel for last year, the London Iron and Coal Trades Review says that the increase of 300,000 tons in exports over those of 1911 was by no means satisfactory. It points out that there was great activity in the export trade in heavy iron and steel throughout the world in 1912, but that the United States and Germany had a much greater percentage increase in exports than Great Britain. The following estimates of iron and steel exports from various countries are given by our contemporary with the statement that, while Great Britain is credited with about 20 per cent. of the net increase of 1,455,000 tons over 1911, Germany and the United States together secured nearly 75 per cent.:

Exports of Principal Iron and Steel Countries—Gross Tons

	Total for 1912	Comparison with 1911
Great Britain	4,814,000	+299,000
Germany	5,625,000	+462,000
United States	2,794,000	+614,000
Belgium	1,606,000	+128,000
France	356,000	-48,000
Totals	15,195,000	Net inc., 1,455,000

Of the total of 4,814,000 tons exported by Great Britain last year, against 4,516,000 tons in 1911, pig iron and ferromanganese shipments amounted to 1,264,000 tons and finished iron and steel to 3,550,000 tons. Going back five years, British exports of finished material in 1907 were 3,324,000 tons, or within 225,000 tons of those for last year. In sheets alone the 1912 exports were 267,000 tons more than in 1907, so that in all other finished lines the outward movement last year fell below what it was five years earlier.

What is as disquieting from the British standpoint as the small gain in iron and steel exports in five years is the marked increase in imports of iron and steel products. Last year these were 1,999,000 tons, or more than double the total of 935,000 tons in 1907. In comparison with 1911 the gain was 237,000 tons. It is interesting to note that the imports of semi-finished steel were 840,000 tons last year, against 803,000 tons in 1911 and only 300,000 tons in 1907. Our London contemporary refers to the comparison between 1907 and 1912 as "almost astounding."

Turning to the estimates given above for the iron and steel exports of other countries in 1912, it should be said that that for the United States is considerably below the actual, indications being, based on the November returns, which have just been published, that this country's record for 1912 will prove to be about 2,950,000 tons. It is to be remembered also that the figures for Great Britain include a number of products

which are not taken account of by weight in the statistics of the United States; further, that the tonnage figures for Germany take in machinery and every form of iron and steel product. The showing for the United States is particularly good, since the 1912 increase over our exports for 1911 was nearly half that of the five countries named above and exceeded the combined gains of Great Britain and Germany.

Economy of a Works Hospital System

The medical department of the Norton Company, Worcester, Mass., has collated the results of the year 1912 in their effect upon shop efficiency. They show that the systematic medical and surgical care of employees under intelligent, aggressive direction, coupled with organized sanitary inspection of works, is a direct source of financial profit, as well as a powerful influence on the physical health and the earning power of the workmen. The percentage of idle hours—the time that men are absent from their work—has been reduced from about 3 to 1½. The sick or injured workmen who receive treatment at the company's hospital average 19.2 hours less of lost time than those employees who do not avail themselves of the opportunity urged upon them, and instead go elsewhere for professional assistance, or, as often happens, receive no attention at all. The medical department's effort to reduce the loss of working time has been extended by the company to a radical curtailment in absences from the works because of personal reasons other than impaired health. Tuberculosis has been stamped out; the cases which were discovered, less than 10 all told, were taken in the incipient stage, and already some of the patients are back at work cured.

A singularly illuminating commentary on the value of prompt treatment of injuries is the fact that in all the 800 accident cases treated in the hospital since its establishment 20 months ago, only one case of septic poisoning has occurred, and that a trivial affair, due to the patient's removing the dressing. The influence of the system in making more cordial relations between workmen and owners has been made evident in many ways, and increases as the work is better understood.

A crowning proof of the effectiveness of the department is that the liability insurance company has granted a premium rebate which covers practically the entire cost of the medical and sanitary departments. In other words, the system is paying its way by the reduction effected in accident risk under the workmen's compensation act.

The saving of idle hours is no mean item of economy. The Norton system applies to some 900 men. A reduction in lost time from 3 per cent. to 1½ per cent. means, roughly, a decrease from 70,000 to 35,000 hours. The production saved is the labor of 600 men for one week of 60 hours. The gain is greater than this, however, for the influence of absence from work may extend beyond the actual labor which the workman fails to perform. The loss from the idleness of certain highly skilled men may be serious in upsetting the balance of production. In such cases the medical department has the chance to cooperate directly with the head of the department, perhaps to tide the man over in his illness until certain necessary work has been completed.

One revelation of the records is that a wide variation exists between departments as to the number of idle hours due to reasons other than that of health. The personality of the foreman is involved, including his leniency as to requests for leave of absence, his degree of indulgence where men fail to appear for work, and his friendliness toward individuals. The rule has been made that a workman is dropped from the rolls automatically if he is absent for a period of more than seven days. Upon his return he must apply for work at the office of the superintendent and must be hired over again, even to the making out of a new card. This gives the superintendent the chance to watch his men and the foreman is eliminated as the judge of the case. The rule works against indulgence in an extra day or two of idleness at the expiration of a period of sickness, and the chronic idler is soon detected.

The Buying Agent and the Honest Salesman

The purchasing agent is frequently the butt of criticism by salesmen. He keeps them waiting too long outside his office, or he plays one against the other in his effort to shave prices. But there is most resentment against the purchasing agent who persists in discrediting the honesty of salesmen. As a matter of fact they average high in sincerity and frankness. They tell the truth about their goods, and are disposed to be fair toward competitors. The successful man on the road knows from his own experience and that of his employers that it is poor business to deceive as to quality or to exaggerate as to advantage in price. He makes his place in his trade by square dealing. The relations of buyer and seller to-day are made or marred by the degree of dependability of the salesman. Therefore the purchasing agent who maintains an attitude of distrust quite naturally breeds dislike.

From the standpoint of the buyer whom the purchasing agent represents in his relations with salesmen, this policy is wholly unprofitable. A man should be considered honest until proved not to be so. Where the general position of the buyer, as represented by his purchasing department, is otherwise, that reputation goes abroad until it is general. The freemasonry of the trade is a powerful influence for good or evil. The prejudice extends to the product. For some houses salesmen always have a good word. For others opinions expressed as to products are of indifference or of genuine ill will.

Protection of Records in Reproduction

The recent destruction by fire of an office building in Cincinnati, in which was located a commercial photographing and engraving plant, has brought home to a number of machine tool builders and other manufacturers the necessity of taking better care of photographic and other like records. Frequently large concerns send original drawings to their photographers with a view to their reproduction finally in printed matter. In many instances no blue prints are made before sending the drawings out, and in the event they are lost new ones must be worked up again. Even where a blue print is taken as a precaution, it is a source of considerable annoyance and delay to make new tracings from the print if the original drawings are not returned. Many firms also allow their photographers to retain negatives and valuable retouched photographs, which if destroyed

would require a long time to reproduce, while the loss sustained could not be adequately covered by insurance.

One of the companies which lost heavily in the Cincinnati fire has now adopted a rule that might well be followed by other manufacturers. Two photographs are taken of each machine tool, and one is stored in the company's fireproof vault and the other is retained by the photographer. All retouched photographs are returned by the engraver as soon as they have served his purpose, and it is also planned to have a duplicate halftone plate made that is stored with the company's other records. The alternative of such special measures by manufacturers is to require photographers and others who are intrusted with the keeping of records of this sort to store them in fireproof vaults.

Closing German Factory Doors

In a statement submitted to the Ways and Means Committee at Washington, John C. Schmidt, president Standard Chain Company, York, Pa., gave an account of the conditions in the chain industry in Europe, as ascertained by him on a visit to various manufacturing localities last year. He shows that the chain makers abroad work long hours at wages much lower than those paid in this country, thus indicating that American chain makers would face serious competition if the duty should be removed. With regard to his experience in endeavoring to visit chain factories in Germany, Mr. Schmidt says:

"I presented a letter of introduction from Senator Oliver to the consul general at Cologne and expressed my desire to visit the chain factories of Germany. My ardor was somewhat chilled by the smiling statement of the consul that the German Government had issued instructions to all manufacturers not to admit foreign visitors to their works and to be particularly careful of admitting any American or Japanese, as these people were coming for no good purpose except to learn the German methods, to be used in their own works, and from my three days' experience in going about from place to place in Westphalia I certainly must compliment the German people as being a loyal nation. With frigid politeness I was barely admitted to the offices and was most smilingly and cheerfully given the glad hand at departure, and then only."

The attitude of Germany toward American visitors, in view of the magnanimous treatment here of German visitors in the past decade and longer, and their wholesale appropriation of American ideas, reminds us of a story. A man who needed a wheelbarrow borrowed one frequently from a neighbor until he almost ruined it. The last time he borrowed it he remarked to the owner, "Well, I have ordered a new wheelbarrow to be delivered to me tomorrow, and I have decided that then I will neither borrow nor lend."

A system of loose-leaf data sheets, devised by John Clinton Parker, general manager of the Parker Boiler Company, Philadelphia, has been published by the Standard Corporation, Pennsylvania Building, Philadelphia. The idea is that sheets with standard engineering information are to be published as often as practicable, punched and indexed, ready for filing and in the usual loose leaf binder, together with blank sheets for the engineer's own notes. Subscribers are expected to suggest subjects for data sheets, and they are intended to accommodate clippings from magazines or digests of articles. The data sheets are 3 3/4 by 6 3/4 in. in size, with information printed on both sides.

Specifications for Steel for Forgings

Adopted by the Association of
American Steel Manufacturers

The Association of American Steel Manufacturers has recently adopted a specification for open-hearth steel blooms, billets and slabs for forging purposes. The need of standard requirements for chemical and other properties of forging billets has been agitated for some time, and it is to be expected that the new specification will be widely used in its field. A new feature is the table of allowable variation on check analyses of carbon, manganese and other elements. In providing this table and giving it general publicity the manufacturers have taken an important step in the general movement toward standardization. The specification is as follows:

I. Manufacture

Process

1. The steel shall be made by the open-hearth process

Discard

2. A sufficient discard shall be made from the top of each ingot to secure freedom from injurious piping and undue segregation.

II. Chemical Properties and Tests

Chemical Composition

3. The steel shall conform to the following requirements as to chemical composition:

Element	Class	Least range to be specified	Allowable variation on check analysis outside of range specified	
			Under	Over
Carbon	Up to 0.10, 0.11 or 0.12	....	....	0.02
	0.10 to 0.25	0.05	0.02	0.05
	0.26 to 0.60	0.10	0.02	0.05
	0.61 to 0.90	0.15	0.02	0.08
	Up to 0.60	0.20	0.05	0.05
Manganese	0.61 and over	0.30	0.05	0.05
		Least maximum to be specified		
Phosphorus	.....	0.040	....	0.03
Sulphur	.....	0.045	....	0.04

Class

4. The class shall be determined by the upper limit specified for carbon and manganese.

Ladle Analyses

5. To determine whether the material conforms to the requirements specified in section 3, an analysis shall be made by the manufacturer from a test ingot taken during the pouring of each melt. If requested, a copy of this analysis shall be given to the purchaser or his representative.

Check Analyses

6. Check analyses may be made by the purchaser in accordance with the standard methods of sampling for check analysis adopted by the Association of American Steel Manufacturers, and these analyses shall conform to the requirements specified in section 3.

III. Workmanship and Finish

Chipping

7. Chipping shall be done in such a manner as not to cause any imperfections when the billets, blooms and slabs are properly forged.

Finish

8. Billets, blooms and slabs shall be free from all injurious defects.

IV. Marking

Marking

9. The melt number shall be legibly stamped on each billet, bloom and slab.

V. Inspection and Rejection

Inspection

10. (a) The inspector, representing the purchaser, shall have free entry at all times while work on the contract of the purchaser is being performed, to all parts of the manufacturer's works which concern the manufacture of the material ordered. The manufacturer shall afford the inspector, free of cost, all reasonable facilities to satisfy him that the material is being furnished in accordance with these specifications.

- (b) The purchaser may make the tests to govern the acceptance or rejection of material in his own laboratory or elsewhere. Such tests, however, shall be made at the expense of the purchaser.

(c) tests and inspection shall be so conducted as not to interfere unnecessarily with the operation of the works.

11. Castings, blooms and slabs which show injurious defects and which are being finished by the purchaser may be rejected, and the manufacturer shall be notified.

12. Samples tested in accordance with section (b) which represent rejected material, shall be preserved for one month from the date of the test report. In case of dissatisfaction with the results of the tests, the manufacturer may make claim for a rehearing within that time.

Women in Ohio Shops and Factories

The report of Commissioner Fred Lange, of the Ohio Bureau of Labor Statistics, for 1912 directs attention to some conditions in connection with the employment of female labor in that State which call for remedy. The commissioner says that he found women engaged in operating large punch presses, wheeling hand trucks and lifting heavy articles which were being manufactured at iron works. He also refers to coremaking in foundries as objectionable employment for women. He found girls working in factories and shops for as low as \$2 and \$3 a week. Cases are reported in which female employees, through excessive heat caused by gas furnace fires in addition to natural summer heat, fell over exhausted and no provision was made for places of rest other than benches or boxes. Violations of the child labor law were found in the canning industries in particular, where conditions are referred to in the report as extremely bad. A general recommendation is made that the women's work hour law be amended and the limit of hours be reduced from nine to eight.

Rolling Mill and Bolt and Nut Works in Alberta

Northwestern Canada is to have a rolling mill. The Redcliff Rolling Mills & Bolt Company is building a plant at Redcliff, Alberta. The products of the works will be bars, bands, angles, channels, bolts, nuts and rivets. The rolling mill equipment will comprise busheling furnaces, a muck mill and a 10-in. Belgian finishing train of rolls. A contract for the muck mill and 10-in. finishing mill has been placed with the United Engineering & Foundry Company, Pittsburgh. Orders for the engines have also been placed. The company is now in the market for a complete equipment of bolt, nut and washer making machinery. This machinery will be purchased by the superintendent, Robert McCleary, Medicine Hat, Alberta.

The St. Louis Municipal Assembly and the Board of Public Improvements have taken up jointly the question of the construction of a new water works plant of a capacity of 150,000,000 gal. of water daily, in addition to the plant now in service. The estimated cost is about \$12,000,000 and the proposed location about nine miles up the Missouri River from St. Charles. The question chiefly at issue is whether the new plant shall be constructed with all possible speed in order to meet pressing needs or whether improvements shall be made in the old plant and the construction of the new plant spread over a period of about 10 years.

According to estimates made by the United States Geological Survey, the figures of coal production in 1912 are sensational, all previous records having been surpassed by about 50,000,000 tons, an increase equal to the total production of the country 40 years ago. The production for 1911 was 496,221,168 net tons; the estimate for 1912 is 550,000,000 tons, and the final figures may even reach a higher mark.

Germany's production of pig iron in 1912 was 17,852,571 metric tons, which is a gain of 15 per cent. over 1911, when the output was 15,557,030 tons. In four years Germany has increased its pig iron production 6,039,000 tons. The December production was 1,566,025 tons, as compared with 1,337,295 tons in November. The output in December was retarded to some extent by car shortage.

Agricultural Implement Exports in 1912

More than \$40,000,000 worth of agricultural implements was exported from the United States to foreign countries in the calendar year just ended. Ten years ago the value of the exportation of this class of manufactures was \$18,000,000; 20 years ago it was but \$4,000,000. Thus the value of this particular class of manufactures exported in 1912 was nearly two and a half times as much as a decade ago and ten times as much as two decades ago. All the world, apparently, buys American agricultural implements. Mowers and reapers exported last year went to more than 75 countries and colonies, including every grand division of the world, while other classes of agricultural implements were widely distributed in the year's export trade. The leading buyers of our agricultural implements are, in the order of magnitude, Russia, Argentina and Canada, with France and Germany about equal in the value of their purchases, though in each case materially less than the three countries first named.

The recent classification of the Bureau of Foreign and Domestic Commerce divides the group of agricultural implements exported into mowers and reapers, plows and cultivators, planters and seeders, threshers, hay rakes and tedders. Of the exports during the calendar year \$21,000,000 worth was mowers and reapers, \$7,000,000 plows and cultivators, \$5,000,000 threshers, \$1,750,000 planters and seeders, and \$500,000 hay rakes.

Garry Iron & Steel Company's Cleveland Offices

The Garry Iron & Steel Company, with main offices at Niles, Ohio, has obtained a 99-year lease on property in Cleveland at St. Clair and West Sixth streets. The Cleveland offices and warehouse, which are now located at 1111 Superior avenue viaduct, will at once be moved to the building at the new location, and a very much larger stock of black and galvanized sheets, formed roofing, conductor pipe and other sheet metal supplies will be carried, with a view to immediate service to the Cleveland trade and prompt shipment by rail and water to surrounding territory, including Lake points such as Detroit, Toledo, etc. The new property is 65 x 181½ ft., thus affording ample space for the increased stocks and more efficient service. A new office building will be erected at once.

Cleveland trade will remember that the Garry Iron & Steel Company moved its main offices from that city to Niles on July 4, 1910. J. Charles Wicks, who at that time was secretary and manager of sales, is now president as well as sales manager, while George C. Johnson and H. G. Long, who also were with the company at Cleveland, are now secretary and treasurer respectively.

The National Screw & Tack Company, Cleveland, Ohio, at its annual meeting, January 16, decided to add \$500,000 to its present common stock capitalization of \$1,250,000. Half of this will go to the stockholders as a 20 per cent. dividend and half will remain in the treasury. Harold G. Alexander was elected treasurer, taking the place of David Auld, Jr., retired. C. W. Brainerd, secretary, was promoted to the office of vice-president. H. T. Beidler was elected secretary. At the annual meeting of the National Acme Mfg. Company it was decided to distribute a stock dividend of 33 1/3 per cent. among shareholders out of the stock in the treasury. W. B. D. Alexander is president of both companies.

Capitalists headed by James Campbell, of St. Louis, president of the North American Company and interested in other large corporations, announce plans for the establishment of a chain of by-product coke ovens and that a 1000-ton plant will be located on the western edge of St. Louis. Coke experts have been examining the conditions with a view to determining the best methods to pursue in connection with that plant.

The formal transfer of the property of the St. Louis Blast Furnace Company, recently sold under foreclosure to the State National Bank of St. Louis, has been completed and the bank announces that the property will be disposed of as soon as possible.

The Iron and Metal Markets

New Buying Not So Active

Pig Iron Quiet with Some Weakness

Heavy Specifications in Finished Lines, Particularly from Railroads

Consumption of iron and steel is undiminished and production continues at the maximum rate. There is less new buying, both of pig iron and finished material. Consumers in all lines are disposed to move carefully, since the trade has passed the period in which buying is stimulated by the expectation of higher prices.

Naturally when prices cease to advance, the reverse tendency is looked for; but in finished material no such development, so far as contract prices are concerned, can be looked for for some months. It is still true of several large steel companies that specifications are exceeding output.

The slowing down in pig iron has developed some weakness, but as always when the immediate future of that market is in doubt, concessions do not make but rather cut off business. The week has developed more inquiry in central and western districts and there are even predictions that a new buying movement will not be long delayed; in the East, on the contrary, sentiment is less confident.

In Southern iron the range of prices for first quarter is still \$13.50 to \$14 at furnace for No. 2 foundry. Some producers are more disposed to make sales abroad, the inquiry from Mediterranean countries being considerable. Our English cable notes a weaker market for Cleveland pig iron, with reports of the offering of Southern iron at Manchester.

Southern Ohio, Buffalo and Pittsburgh are the districts in which some furnaces have been willing to shade foundry iron prices that seemed to be stiffly held in December. The iron reported to be offered at Pittsburgh by Cleveland interests at less than the \$17.50 Valley basis for No. 2 would presumably come from a western Pennsylvania furnace.

While demand, rather than cost of raw materials, determines pig iron prices, some attention is given to the recession in prompt coke, which can now be had at \$3.75, as against \$4.10 at the opening of the year, while contract coke is on a basis of \$3 for the year and of \$3.25 for the first half.

The leading Pittsburgh steel company is negotiating for steel billets and the stress in semi-finished material is shown by the payment of as high as \$30 for open hearth billets and \$31 for sheet bars at Pittsburgh. Little relief will come in the next few months from the steel capacity now building in the Central West.

Heavy specifying by railroads, particularly for track fastenings, is still a marked feature in the Chicago district. Rail orders are likely to fall off, as most of the mills entered the year with seven or eight months' business on their books. One Western road is considering Bessemer rails, instead of open hearth, as earlier delivery can be promised.

Bids are to be opened in New York January 28 for 12,000 tons of steel for the extension of the Second avenue elevated road in the borough of Queens. An interesting inquiry in the Eastern market is for 6000 tons of angles for transmission towers for export in May, June and July. To get the necessary deliveries

the order must be divided among several mills. The Sheridan, Pa., bridge for the Pennsylvania Lines West, 6600 tons, went to the American Bridge Company.

For the new battleship Pennsylvania, on which bids go in February 14, apart from armor plate 14,000 tons of hull plates and shapes and protective deck plates will be required. Pittsburgh plate mills have orders for four to six months and contracts for eight to ten months ahead. Eastern plate mills have made sales for early delivery at 1.60c., and in the Chicago district as high as 1.83c. delivered, or 1.65c. Pittsburgh, has been paid for plates from eastern mills.

In some of the lighter lines—tin plate, wire and cold rolled products—new business has not been heavy. There is the beginning, however, of specifying in tin plate for the salmon packing trade.

Steel bar mills have long been heavily sold and iron rolling mills are still reaping a harvest from business the former could not take, bar iron for early delivery bringing from \$5 to \$6 a ton above the contract basis for steel bars.

Birmingham district pipe works have taken about 10,000 tons in the past week, including 4000 tons for Seattle and 4000 tons for Kansas City. Boston opens bids on January 27 for 3160 tons.

The supply of scrap in nearly all markets is somewhat unwieldy, and in heavy melting steel the situation is increasingly in the buyer's favor.

A Comparison of Prices

Advances over the previous week in heavy type, declines in italics

At date, one week, one month and one year previous.

	Jan. 22, 1913.	Jan. 15, 1913.	Dec. 24, 1912.	Jan. 24, 1912.
Pig Iron, Per Gross Ton:	1913.	1913.	1912.	1912.
Foundry No. 2 X, Philadelphia	\$18.25	\$18.50	\$18.50	\$14.85
Foundry No. 2, Valley furnace	17.50	17.50	17.50	13.00
Foundry No. 2 S't'h'n, Cin'ti...	16.75	16.75	17.25	13.25
Foundry No. 2, Birmingham, Ala.	13.50	13.50	14.00	10.00
Foundry No. 2, furnace, Chicago*	18.00	18.00	18.00	14.00
Basic, delivered, eastern Pa....	18.00	18.00	18.25	14.25
Basic, Valley furnace	16.35	16.35	16.50	12.25
Bessemer, Pittsburgh	18.15	18.15	18.15	14.90
Malleable Bessemer, Chicago*...	18.00	18.00	18.00	14.35
Gray forge, Pittsburgh	17.15	17.15	17.15	13.40
Lake Superior charcoal, Chicago	18.00	18.00	18.75	16.00

Billets, etc., Per Gross Ton:

Bessemer billets, Pittsburgh...	28.50	28.50	27.00	20.00
Open hearth billets, Pittsburgh	29.00	29.00	28.50	20.00
Forging billets, Pittsburgh...	36.00	36.00	35.00	28.00
Open hearth billets, Philadelphia	32.00	32.00	32.00	22.40
Wire rods, Pittsburgh.....	30.00	30.00	30.00	24.50

Old Material, Per Gross Ton:

Iron rails, Chicago.....	16.75	17.50	17.25	15.00
Iron rails, Philadelphia.....	18.00	18.00	18.00	16.50
Car wheels, Chicago.....	16.75	17.25	17.00	13.25
Car wheels, Philadelphia.....	16.25	16.25	16.00	12.00
Heavy steel scrap, Pittsburgh..	15.00	15.00	14.75	12.75
Heavy steel scrap, Chicago....	12.50	12.75	12.50	10.50
Heavy steel scrap, Philadelphia	14.75	14.75	14.50	12.00

Finished Iron and Steel,

Per Pound to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Bessemer rails, heavy, at mill...	1.25	1.25	1.25	1.25
Iron bars, Philadelphia.....	1.77½	1.77½	1.67½	1.27½
Iron bars, Pittsburgh.....	1.70	1.70	1.70	1.25
Iron bars, Chicago.....	1.57½	1.57½	1.57½	1.15
Steel bars, Pittsburgh, future..	1.40	1.40	1.40	1.15
Steel bars, Pittsburgh, prompt..	1.56	1.56	1.56	1.31
Steel bars, New York, future...	1.86	1.86	1.86	1.31
Steel bars, New York, prompt...	1.50	1.50	1.50	1.15
Tank plates, Pittsburgh, future	1.75	1.75	1.75	1.15
Tank plates, Pittsburgh, prompt	1.66	1.66	1.66	1.31
Tank plates, New York, future	1.91	1.91	1.91	1.31
Tank plates, New York, prompt	1.50	1.50	1.50	1.15
Beams, Pittsburgh, future.....	1.75	1.75	1.75	1.15
Beams, Pittsburgh, prompt.....	1.66	1.66	1.66	1.31
Beams, New York, future.....	1.91	1.91	1.91	1.31
Beams, New York, prompt.....	1.50	1.50	1.50	1.15
Angles, Pittsburgh, future.....	1.75	1.75	1.75	1.15
Angles, Pittsburgh, prompt.....	1.66	1.66	1.66	1.31
Angles, New York, future.....	1.91	1.91	1.91	1.31
Angles, New York, prompt.....	1.45	1.45	1.45	1.15
Skelp, grooved steel, Pittsburgh	1.50	1.50	1.50	1.20
Skelp, sheared steel, Pittsburgh	1.60	1.60	1.50	1.25
Steel hoops, Pittsburgh.....				

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

Sheet Nails and Wire,	Jan. 22, 1913		Jan. 15, 1913		Dec. 24, 1912		Jan. 24, 1912	
	Cents.		Cents.		Cents.		Cents.	
Sheet, black, No. 28, Pittsburgh	2.35		2.35		2.25		1.90	
Wire, black, Pittsburgh	1.75		1.75		1.75		1.60	
Cut nails, f.o.b. Eastern mills	1.75		1.75		1.75		1.60	
Cut nails, Pittsburgh	1.70		1.70		1.70		1.55	
Fence wire, ann'd, 0 to 9, Pgh.	2.15		2.15		2.15		1.90	
Barbed wire, galv., Pittsburgh	2.15		2.15		2.15		1.90	

Coke, Connellsville, Per Net Ton, at Oven:				
Furnace coke, prompt shipment	\$3.75	\$4.00	\$4.00	\$1.75
Furnace coke, future delivery	3.25	3.25	3.25	1.70
Furnace coke, prompt shipment	4.25	4.50	4.50	2.00
Furnace coke, future delivery	3.60	3.75	4.00	2.10

Metals,	Per Pound to Large Buyers:		Cents.		Cents.		Cents.		Cents.	
	Cents.		Cents.		Cents.		Cents.		Cents.	
Lake copper, New York	16.37½		17.25		17.62½		14.50			
Electrolytic copper, New York	16.12½		17.00		17.50		14.25			
Spelter, St. Louis	6.95		7.10		7.15		6.40			
Spelter, New York	7.10		7.25		7.30		6.55			
Lead, St. Louis	4.20		4.20		4.12½		4.37½			
Lead, New York	4.35		4.35		4.27½		4.45			
Tin, New York	50.50		51.00		50.15		42.87½			
Antimony, Hallett, New York	9.25		9.37½		9.50		7.55			
Tin plate, 100-lb. box, Pittsburgh	\$3.60		\$3.60		\$3.60		\$3.40			

Finished Iron and Steel f.o.b. Pittsburgh

Freight rates from Pittsburgh in carloads, per 100 lb.: New York, 16c.; Philadelphia, 15c.; Boston, 18c.; Buffalo, 11c.; Cleveland, 10c.; Cincinnati, 15c.; Indianapolis, 17c.; Chicago, 18c.; St. Louis, 22½c.; Kansas City, 42½c.; Omaha, 42½c.; St. Paul, 32c.; Denver, 84½c.; New Orleans, 30c.; Birmingham, Ala., 45c.; Pacific coast, 80c. on plates, structural shapes and sheets No. 11 and heavier; 85c. on sheets Nos. 12 to 16; 95c. on sheets No. 16 and lighter; 65c. on wrought pipe and boiler tubes.

Plates.—Tank plates, ¼ in. thick, 6¼ in. up to 100 in. wide, 1.50c. to 1.75c., base, net cash, 30 days. Following are stipulations prescribed by manufacturers, with extras:

Rectangular plates, tank steel or conforming to manufacturers' standard specifications for structural steel dated February 6, 1903, or equivalent, ¼ in. and over on thinnest edge, 100 in. wide and under, down to but not including 6 in. wide, are base.

Plates up to 72 in. wide, inclusive, ordered 10.2 lb. per sq. ft., are considered ¼ in. plates. Plates over 72 in. wide must be ordered ¼ in. thick on edge, or not less than 11 lb. per sq. ft., to take base price. Plates over 72 in. wide ordered less than 11 lb. per sq. ft., down to the weight of 3-16 in., take the price of 3-16 in.

Allowable overweight, whether plates are ordered to gauge or weight, to be governed by the standard specifications of the Association of American Steel Manufacturers.

Extras.	Cents per lb.
Gauges under ¼ in. to and including 3-16 in.	.10
Gauges under 3-16 in. to and including No. 2	.15
Gauges under No. 8 to and including No. 9	.25
Gauges under No. 9 to and including No. 10	.30
Gauges under No. 10 to and including No. 12	.40
Sketches (including straight taper plates) 3 ft. and over	.10
Complete circles, 3 ft. in diameter and over	.20
Boiler and flange steel	.10
"A. B. M. A." and ordinary firebox steel	.20
Still bottom steel	.30
Marine steel	.40
Locomotive fire box steel	.50
Widths over 100 in. up to 110 in., inclusive	.05
Widths over 110 in. up to 115 in., inclusive	.10
Widths over 115 in. up to 120 in., inclusive	.15
Widths over 120 in. up to 125 in., inclusive	.25
Widths over 125 in. up to 130 in., inclusive	.50
Widths over 130 in.	1.00
Cutting to lengths or diameters under 3 ft. to 2 ft., inc.	.25
Cutting to lengths or diameters under 2 ft. to 1 ft., inc.	.50
Cutting to lengths or diameters under 1 ft.	1.55
No charge for cutting rectangular plates to lengths 3 ft. and over.	

Structural Material.—I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in. on one or both legs, ¼ in. thick and over, and tees, 3 in. and over, 1.50c. to 1.75c. Extras on other shapes and sizes are as follows:

	Cents per lb.
I-beams over 15 in.	.10
H-beams over 18 in.	.10
Angles over 6 in. on one or both legs	.10
Angles, 3 in. on one or both legs, less than ¼ in. thick, as per steel bar card, Sept. 1, 1909	.70
Tees, structural sizes (except elevator, hand rail, car truck and conductor rail)	.05
Angles, channels and tees, under 3 in. wide as per steel bar card, Sept. 1, 1909	.20 to .80
Deck beams and bulb angles	.30
Hand rail tees	.75
Cutting to length, under 3 ft., to 2 ft. inclusive	.25
Cutting to length, under 2 ft., to 1 ft. inclusive	.50
Cutting to length, under 1 ft.	1.55
No charge for cutting to lengths 3 ft. and over.	

Wire Rods and Wire.—Bessemer, open hearth and chain rods, \$30. Fence wire, Nos. 0 to 9, per 100 lb. terms 60 days or 2 per cent. discount in 10 days, carload lots to jobbers, annealed, \$1.55; galvanized, \$1.95. Galvanized barb wire, to jobbers, \$2.15; painted, \$1.75. Wire nails to jobbers, \$1.75.

The following table gives the price to retail merchants on fence wire in less than carloads, with the extras added to the base price:

Plain Wire, per 100 lb.										
Nos.	0 to 9	10	11	12 & 12½	13	14	15	16		
Annealed	\$1.70	\$1.75	\$1.80	\$1.85	\$1.95	\$2.05	\$2.15	\$2.25		
Galvanized	2.10	2.15	2.20	2.25	2.35	2.45	2.55	2.95		

Wrought Pipe.—The following are the jobbers' carload discounts on the Pittsburgh basing card on steel pipe (full weight) in effect from January 1, 1913; iron pipe (full weight), from October 21, 1912:

Butt Weld.					
Steel.			Iron.		
Inches.	Black.	Galv.	Inches.	Black.	Galv.
½, ¾ and 1	73	52½	¾ and 1	67	48
1½	77	66½	1½	66	47
¾ to 3	80	71½	2	70	57
			¾ to 2½	73	62

Lap Weld.					
2	77	68½	1½	57	46
2½ to 6	79	70½	1½	68	57
7 to 12	76	65½	2	69	59
13 to 15	53	..	2½ to 4	71	62
			4½ to 6	71	62
			7 to 12	69	56

Plugged and Reamed.					
1 to 3, butt	78	69½	1 to 1½, butt	71	60
2, lap	75	66½	2, butt	72	61
2½ to 4, lap	77	68½	1½, lap	55	44
			1½, lap	66	55
			2, lap	67	57
			2½ to 4, lap	69	60

Butt Weld, extra strong, plain ends.					
¾, ¾ and 1	68	57½	¾	64	53
1½	73	66½	1½	68	61
¾ to 1½	77	70½	¾ to 1½	72	63
2 to 3	78	71½	2 and 2½	73	64

Lap Weld, extra strong, plain ends.					
2	74	65½	1½	66	60
2½ to 4	76	67½	2	67	59
4½ to 6	75	66½	2½ to 4	71	62
7 to 8	68	57½	4½ to 6	70	61
9 to 12	63	52½	7 and 8	64	54
			9 to 12	59	48

Butt Weld, double extra strong, plain ends.					
¾	63	56½	1½	58	50
¾ to 1½	66	59½	¾ to 1½	61	53
2 to 2½	68	61½	2 to 2½	63	55

Lap Weld, double extra strong, plain ends.					
2	64	57½	2	56	50
2½ to 4	66	59½	2½ to 4	61	55
4½ to 6	65	58½	4½ to 6	60	54
7 to 8	58	47½	7 to 8	53	43

The above discounts are subject to the usual variation in weight of 5 per cent. Prices for less than carloads are two (2) points lower basing (higher price) than the above discounts on black and three (3) points on galvanized.

Boiler Tubes.—Discounts on lap welded steel and standard charcoal iron boiler tubes to jobbers in carloads, in effect from January 1, 1913, are as follows:

Lap Welded Steel.		Standard Charcoal Iron.	
1 3/4 and 2 in.	61	1 1/2 in.	44
2 1/4 in.	58	1 1/2 and 2 in.	48
2 1/2 and 2 3/4 in.	64	2 1/4 in.	44
3 and 3 1/4 in.	69	2 1/2 and 2 3/4 in.	53
3 1/2 to 4 1/2 in.	71	3 and 3 1/4 in.	55
5 and 6 in.	64	3 1/2 to 4 1/2 in.	58
7 to 13 in.	61	Locomotive and steamship special grades bring higher prices.	

2½ in. and smaller, over 18 ft., 10 per cent. net extra.
2½ in. and larger, over 22 ft., 10 per cent. net extra.
Less than carloads will be sold at the delivered discounts for carloads, lowered by two points for lengths 22 ft. and under to nations east of the Mississippi River; lengths over 22 ft. and all shipments going west of the Mississippi River must be sold f.o.b. mill at Pittsburgh basing discount, lowered by two points.

Sheets.—Makers' prices for mill shipments on sheets of U. S. Standard gauge, in carload and larger lots, on which jobbers charge the usual advance for small lots from store, are as follows, f.o.b. Pittsburgh, terms 30 days net or 2 per cent. cash discount in 10 days from date of invoice:

Blue Annealed Sheets.		Cents per lb.
Nos. 3 to 8		1.70
Nos. 9 and 10		1.75
Nos. 11 and 12		1.80
Nos. 13 and 14		1.85
Nos. 15 and 16		1.90

Box Annealed Sheets, Cold Rolled.		
Nos. 10 and 11		2.00
No. 12		2.00
Nos. 13 and 14		2.05
Nos. 15 and 16		2.10
Nos. 17 to 21		2.15
Nos. 22 and 24		2.20
Nos. 25 and 26		2.25
No. 27		2.30
No. 28		2.35
No. 29		2.40
No. 30		2.50

Galvanized Sheets of Black Sheet Gauge.

	Cents per lb.
Nos. 10 and 11	2.50
No. 12	2.60
Nos. 13 and 14	2.60
Nos. 15 and 16	2.75
Nos. 17 to 21	2.90
Nos. 22 and 24	3.05
Nos. 25 and 26	3.20
No. 27	3.35
No. 28	3.50
No. 29	3.65
No. 30	3.80

Pittsburgh

PITTSBURGH, PA., January 21, 1913.

Several of the larger steel companies in this district report that specifications against contracts are still ahead of output. While the new demand has slowed down this is not causing the slightest uneasiness, but is rather welcomed, as most of the leading steel makers have nothing to sell for delivery inside of six to eight months. The pig iron market is quiet but firm. The steel billet situation is as tight as ever and the Carnegie Steel Company is negotiating for a round lot from an outside mill that it will probably buy this week. Prices on finished iron and steel all along the line are strong. The only two weak points are scrap and coke. The latter has weakened considerably in the past week, due largely to the heavy output. The open winter has been a blessing to the iron trade as it has allowed incoming and outgoing material to move promptly. Complaints regarding shortage of cars are not so numerous as expected and there has not been much trouble over delayed shipments. The open weather has also been conducive to a heavier consumption of all forms of finished iron and steel used in outside work.

Pig Iron.—The total purchases of Bessemer iron by the Jones & Laughlin Steel Company are put at about 42,000 tons, all for delivery in the present quarter at its South Side works. There have been sales in the past week of about 5000 tons of malleable Bessemer iron to local consumers at prices ranging from \$17 to \$17.25 at Valley furnace. Reports are that a Cleveland interest is offering No. 2 foundry iron in this market at slightly less than the equivalent of \$17.50, Valley. This iron, however, would probably be shipped from a nearby furnace which has a rate to Pittsburgh of 75c. a ton. Basic iron is quiet but firm. The makers are holding basic at \$16.50 to \$17 at furnace, but some dealers are offering it in lots of 2000 to 3000 tons or more at about \$16.35, Valley furnace. We quote standard Bessemer iron for first half delivery at \$17.25 to \$17.50; basic, \$16.35 in small lots and \$16.50 in large lots; malleable Bessemer, \$17 to \$17.25; No. 2 foundry, \$17.50 to \$17.75; gray forge, \$16.25 to \$16.50, all at Valley furnace, the freight rate for delivery in the Pittsburgh district being 90c. a ton.

Billets and Sheet Bars.—The shortage in supply of Bessemer and open hearth steel that has been a feature of the market for some months seems to be getting worse. Reports are going of a sale of 1000 tons of open hearth billets at close to \$30, and of the same tonnage of open hearth sheet bars at close to \$31, for delivery in the Pittsburgh district. These prices represent premiums that consumers paid to get the steel. There will be no increase in steel capacity in the next few months and no relief is in sight. Under present conditions it is hard to quote the market, as prices on the few sales of billets and sheet bars being made are governed entirely by the conditions attached to them. We quote the steel market nominally as follows: Bessemer billets, \$28.50 to \$29; Bessemer sheet bars, \$29 to \$29.50; open hearth billets, \$29 to \$29.50, and open hearth sheet bars, \$29.50 to \$30, f.o.b. mill, Pittsburgh or Youngstown. Forging billets are \$36 to \$37 and axle billets \$34 to \$35, Pittsburgh.

Ferroalloys.—The flurry in the local ferromanganese market due to resales of a week or 10 days ago is pretty well over, material again being scarce and bringing high prices. We note sales of several carloads of 80 per cent. English ferromanganese at \$65 to \$70, Baltimore, but the market to-day is higher. We quote 80 per cent. English or German for delivery over first half and also for delivery over the entire year at \$65, Baltimore, while prompt is ruling at \$67.50 to \$70 in carload lots, the freight rate for delivery in the Pittsburgh district being \$1.95 a ton. The market on ferrosilicon is very strong and frequent small sales at regular prices are being made. We quote 50 per cent. ferrosilicon, in lots up to 100 tons, at \$75; over 100 tons to 600 tons, \$74; over 600 tons, \$73, Pittsburgh. We quote 10 per cent. at \$24; 11 per cent., \$25; 12 per cent., \$26, f.o.b. cars at furnace, Jackson, Ohio, or Ashland, Ky. We quote ferrotitanium at 8c. per lb. in

carloads; 10c. in 2000-lb. lots and over and 12½ c. in lots up to 2000 lb.

Steel Rails.—No new buying in standard sections is reported, but the new demand and specifications for light rails are active. The Carnegie Steel Company is rolling standard sections on its No. 1 rail mill at Bessemer, sheet bars on No. 2 and light rails on No. 3. The Nos. 1 and 2 mills are sold up for three months or longer. New orders and specifications for light rails in the past week amounted to about 4500 tons. We quote splice bars at 1.50c. per lb., and standard section rails at 1.25c. per lb. Light rails are quoted as follows: 25, 30, 35, 40 and 45-lb. sections, 1.25c.; 16 and 20-lb., 1.30c.; 12 and 14-lb., 1.35c., and 8 and 10-lb., 1.40c., all in carload lots, f.o.b. Pittsburgh.

Wire Rods.—An active inquiry is in the market for 1000 tons of Bessemer or open-hearth rods, and the prospective buyer is having trouble to find a mill that can make the deliveries wanted, as rods are very scarce. The quotation last week of \$31 on wire rods was an error and should have read \$30. We quote Bessemer, open-hearth and chain rods at \$30, Pittsburgh.

Muck Bar.—In the absence of sales, we quote best grades of muck bar, made from all pig iron, at nominally \$31, delivered to buyer's mill in the Pittsburgh district.

Skelp.—Sales of 3000 to 4000 tons of wide sheared iron plates are reported at about 1.90c., Pittsburgh, for delivery in second quarter. The mills have their output pretty well sold for the next 90 days or longer. We quote grooved skelp at 1.45c. to 1.50c.; sheared steel skelp, 1.50c. to 1.55c.; grooved iron skelp, 1.75c. to 1.80c.; sheared iron skelp, 1.85c. to 1.90c., delivered at buyers' mills in the Pittsburgh district.

Plates.—It is officially declared that the reported Harriman order for 12,600 cars has not been placed, but from the same source comes the statement that at least 5000 of these cars will go to the Bettendorf Axle Company. The Louisville & Nashville has bought 2500 steel hopper cars from the Pressed Steel Car Company. Inquiries are in the market for upward of 20,000 cars of various kinds. The steel car companies are pretty well filled for three or four months ahead, and with the bad deliveries of plates from mills they are not able to turn out their full complement of cars. Bids will be opened February 14 for the new battleship Pennsylvania, which will take about 14,000 tons of plates, shapes and protective deck plates, aside from the armor plate. The plate mills have actual orders on their books covering their output for four to six months and contracts for eight to ten months ahead. Reasonably prompt plates are still bringing premiums of \$5 to \$7 a ton over regular prices. We quote ¼-in. and heavier tank plates at 1.45c. to 1.50c., Pittsburgh, for delivery at convenience of the mill, which would be not before second quarter and possibly third quarter, while for delivery in four to six weeks from 1.55c. to 1.60c. is quoted, and for shipment in two weeks, 1.75c. to 1.80c. can be had.

Structural Material.—The American Bridge Company has taken 6600 tons of steel for a new bridge for the Pennsylvania Lines West at Sheridan, Pa., and the Jones & Laughlin Steel Company has taken 600 tons for a new bank building for the City Bank and Trust Company, Mobile, Ala.; 250 tons for the New England Concrete Construction Company, Nonnekeag, Mass., and about 200 tons for two bridges for the West Side Electric Street Railway Company near Charleroi, Pa. Bids have gone in on 500 tons of steel for a new foundry to be built by the Westinghouse Air Brake Company, Wilmerding, Pa. The Jones & Laughlin Company announces that it is now accepting orders for deliveries on plates and shapes over all of this year at 1.50c. and steel bars at 1.40c., Pittsburgh. We quote beams and channels up to 15-in. at 1.45c. to 1.50c. for delivery at convenience of the mill, which means third or fourth quarter of this year, while small lots from warehouse or other sources for delivery in three to four weeks are bringing all the way from 1.75c. to 2c. or higher.

Car Wheels.—A Western road is reported to have ordered 6000 steel car wheels from a local interest. We quote 33-in. rolled steel wheels for freight service at \$15 to \$15.50 and 36-in. for passenger cars at \$19 to \$19.50 per wheel, f.o.b. Pittsburgh.

Iron and Steel Bars.—The new demand is fairly active, but is not so heavy as in the last two or three months, large consumers having contracted for their supply for the first half of this year and a good many are covered for the entire year. The two leading makers of steel bars have for some time been accepting

contracts for all of this year's delivery on the basis of 1.40c. and have an enormous tonnage booked. The new demand for iron bars is holding up well and the mills are pretty well filled for the first half. Indications now are that the iron and steel bar mills will operate to full capacity through the first half and probably over all of this year. We quote merchant steel bars at 1.40c. to 1.45c. for delivery at convenience of the mill, while for fairly prompt shipment 1.60c. to 1.75c. is paid by consumers. We quote iron bars at 1.70c. to 1.75c. for reasonably prompt shipment. Mills charge \$1 extra per ton for twisting 1/4-in. and larger steel bars and \$2 extra for 1/2 to 3/4 in.

Sheets.—The American Sheet & Tin Plate Company is accepting orders from some of its manufacturing customers for delivery in third quarter on the basis of 2.35c. for No. 28 black and 3.50c. for No. 28 galvanized, and has booked a fair amount of business of this kind. New buying is fairly active. Specifications against contracts continue to come into the mills at a heavy rate, and sheets for reasonably prompt delivery are hard to obtain. The market is firm on the basis of 1.75c. for No. 10 blue annealed; 2.35c. for No. 28 Bessemer black sheets; 3.50c. for No. 28 galvanized and 2.30c. for No. 28 tin mill black plate. These prices are f.o.b. Pittsburgh, in carload and larger lots, jobbers charging the usual advances for small lots from store.

Tin Plate.—Several large makers report that specifications against contracts from the salmon packing interests are starting to come in, but these will not reach maximum until late in February or early in March. The new demand for tin plate continues dull, as this is between seasons, and the mills are running now mostly on stock to meet specifications on contracts placed last fall. The market is firm on the basis of \$3.60 for 100-lb. cokes and \$3.45 for 100-lb. ternes, f.o.b. Pittsburgh.

Spelter.—The market is quiet and weak. We quote prime grades of Western at 7.10c., East St. Louis, equal to 7.22 1/2c. Pittsburgh.

Railroad Spikes.—As most of the railroads have covered their requirements for the first half and some for the entire year, new demand is quiet. All spike makers have their product sold for the next three months or longer. We quote railroad spikes in base sizes, 5 1/2 x 9 1/2 in., at \$1.90, and small railroad and boat spikes at \$1.90 and \$2 per 100 lb., f.o.b. Pittsburgh, for forward delivery. Small spikes have sold as high as \$2.25 for prompt shipment.

Hoops and Bands.—The new demand is light, as most consumers have covered their needs to July 1. They are specifying freely against contracts. We quote steel bands at 1.45c. to 1.50c., with extras as per the steel bar card, and steel hoops at 1.60c. to 1.65c. f.o.b. Pittsburgh, these prices being on orders for shipment at convenience of the mills.

Shafting.—It is stated that the higher discounts adopted two weeks ago are being firmly held. Makers report the new demand moderately active, with good specifications against contracts. We quote cold rolled shafting at 58 per cent. off in carloads and larger lots and 52 per cent. in small lots delivered in base territory.

Merchant Steel.—Consumers are specifying liberally against contracts placed with the mills some time ago and the present demand is fairly active. We quote: Iron finished tire, 1 1/2 x 3/4 in. and larger, 1.40c. to 1.55c., base; under 1 1/2 x 3/4 in., 1.55c. to 1.65c.; planished tire, 1.60c. to 1.70c.; channel tire, 3/4, 7/8 and 1 in., 1.90c. to 2c.; 1 1/8 in. and larger, 1.80c. to 1.90c.; toe calk, 2c. to 2.10c., base; flat sleigh shoe, 1.50c. to 1.65c.; concave and convex, 1.80c. to 1.90c.; cutter shoe, tapered or bent, 2.30c. to 2.40c.; spring steel, 2c. to 2.10c.; machinery steel, smooth finish, 1.80c. to 1.85c. We quote cold rolled strip steel as follows: Base rates for 1 in. and 1 1/2 in. and wider, under 0.20 carbon, and No. 10 and heavier, hard temper, 3.30c.; soft, 3.55c.; coils, hard, 3.20c.; soft, 3.45c.; freight allowed. The usual differentials apply for lighter gauges and sizes.

Merchant Pipe.—It develops that the order for 180 miles of 12-in. pipe for the Columbia Gas & Electric Company has not yet been actually placed but it will probably go to a Youngstown mill. The Philadelphia Company of this city has sent out an inquiry for about 8300 tons of wrought iron tubing and casing. Mills report that the new demand for both iron and steel pipe so far this month has been heavier than in the same period in December, and specifications against contracts are still coming in well. It is stated that the new discounts on iron and steel pipe are being firmly held.

Boiler Tubes.—Locomotive builders and other large consumers are specifying satisfactorily against their contracts and the new demand is excellent. The business in seamless tubing handled in 1912 was much heavier than in any previous year and promises to be fully as large this year. The makers of seamless tubing are reported back in deliveries six to eight weeks or longer.

Bolts and Rivets.—These products are in sharp demand. Consumers who covered their requirements for first quarter and first half are specifying liberally. It is stated that, for reasonably prompt shipment, premiums are still being paid over regular prices. We quote button head structural rivets at \$2.20 and cone head boiler rivets at \$2.30 per 100 lb. The discounts on bolts are as follows, in lots of 300 lb. or over, delivered within a 20c. freight radius of maker's works:

Coach and lag screws	80 and 10% off
Small carriage bolts, cut threads	.75 and 5% off
Small carriage bolts, rolled threads	.75 and 10% off
Large carriage bolts	.75, 10 and 5% off
Small machine bolts, rolled threads	.75, 10 and 5% off
Small machine bolts, cut threads	.75 and 10% off
Large machine bolts	.70 and 7% off
Machine bolts with C.P.C. and T nuts, small	.75 and 5% off
Machine bolts with C.P.C. and T nuts, large	.75 and 5% off
Square hot pressed nuts, blanked and tapped	\$5.70 off list
Hexagon nuts	\$6.30 off list
C.P.C. and R. square nuts, tapped and blank	\$5.70 off list
Hexagon nuts 3/4 and larger	\$6.60 off list
Hexagon nuts smaller than 3/4	\$7.20 off list
C.P. plain square nuts	\$5.20 off list
C.P. plain hexagon nuts	\$5.50 off list
Semi-finished hexagon nuts 3/4 and larger	.85% off
Semi-finished hex. nuts smaller than 3/4	.85 and 10% off
Rivets, 7/16 x 6 1/2, smaller and shorter	.75, 10 and 10% off
Rivets, metallic tinned, bulk	3 1/2c. per lb. net extra
Rivets, tin plated, bulk	1 1/2c. per lb. net extra
Rivets, metallic tinned, packages	.70, 10 and 10% off

Wire Products.—It is stated that specifications are in the hands of makers for all the wire nails sold at the \$1.70 basis, but shipments against these contracts are still going out from the mills. The new demand for wire nails and wire is fairly active and shipments this month are expected to be fully as heavy as in December, which made a record for that month. We quote wire nails at \$1.75 per keg; cut nails, \$1.70 per keg; galvanized barb wire, \$2.15 per 100 lb.; painted, \$1.75; annealed fence wire, \$1.55, and galvanized fence wire, \$1.95, f.o.b. Pittsburgh, usual terms, freight added to point of shipment. Jobbers charge the usual advances for small lots from store.

Connellsville Coke.—Inquiry has abated considerably and prices on prompt furnace coke are lower. A consumer in the Valley and one east of Pittsburgh held up some coke in the past week and this put a little more on the market for prompt delivery; in addition to this the output is very heavy. Standard grades of furnace coke for prompt shipment are now obtainable at \$3.75 to \$3.90, while some grades not so favorably known and not quite so high in quality can be had at \$3.50 or lower. On standard makes of furnace coke for the full year delivery \$3 at oven is about the market price and on first six months about \$3.25. The foundry coke market is also quiet, most consumers being covered and not taking in their coke very freely. We quote standard makes of blast furnace coke for prompt delivery at \$3.75 to \$3.90 per net ton at oven; contracts for first half, \$3.25; contracts for over all of the year, \$3. We quote standard makes of furnace coke for prompt shipment at \$4.25 to \$4.50 and on contracts for first half \$3.60 to \$3.75 per net ton at oven. The Connellsville Courier gives the production of the Upper and Lower Connellsville regions last week as 404,397 net tons, an increase over the previous week of 20,000 tons.

Iron and Steel Scrap.—There is no improvement in the new demand and prices are weaker. Embargoes are on at the West Penn Steel Company, Brackenridge, Pa., and the Pittsburgh Steel Company, Monessen, Pa., naturally further unsettling the market. There is more scrap available than there is demand for, consumers have heavy stocks on hand and the outlook for the immediate future is not good. Heavy steel scrap can now be delivered to consumers' mills in the Pittsburgh and nearby districts at \$15, while basic iron, which usually sells side by side with heavy steel scrap, is about \$2.50 a ton higher. Prices on rerolling rails are slightly better, but for the first time in some years turnings are quoted at a slightly lower price than borings, this being probably due to the embargoes at Brackenridge and Monessen. A local steel company is dominating the market on heavy steel scrap and is taking up odd lots right along at \$15, delivered. We note sales to this consumer in the past week of 4000 to 5000 tons. A sale is also reported of low phosphorus crop ends at \$18, delivered. Dealers now quote, per gross ton, as follows:

Heavy steel scrap, Steubenville, Bracken-	
ridge, Sharon, Monessen and Pittsburgh	
delivery	\$15.00
No. 1 foundry cast	\$14.50 to 14.75
No. 2 foundry cast	13.50 to 13.75
Bundled sheet scrap, f.o.b. consumers' mills,	
Pittsburgh district	12.75
Rerolling rails, Newark and Cambridge,	
Ohio, Cumberland, Md., and Franklin, Pa.	17.25 to 17.50
No. 1 railroad malleable stock	14.25 to 14.50
Grate bars	10.50 to 10.75
Low phosphorus melting stock	17.50 to 18.00
Iron car axles	24.00 to 24.25
Steel car axles	17.50 to 17.75
Locomotive axles, steel	21.00 to 21.25
Locomotive axles, iron	27.00 to 27.50
No. 1 busheling scrap	13.75 to 14.00
No. 2 busheling scrap	11.75 to 12.00
Old car wheels	16.25 to 16.50
Cast iron borings	10.50 to 10.75
Machine shop turnings	10.25 to 10.50
Sheet bar crop ends	16.50 to 16.75
Old iron rails	16.25 to 16.50
No. 1 railroad wrought scrap	15.00 to 15.25
Heavy steel axle turnings	12.75 to 13.00
Stove plate	10.50 to 10.75

Chicago

CHICAGO, ILL., January 20, 1913.

January will show some falling off in sales from the high records of 1912 and in some quarters a lighter volume of specifications. This condition is not general in view of specifications received by the leading interest which continue in astonishing volume. Railroad specifications, especially for track fastenings, are particularly heavy, but otherwise orders are well distributed through all lines of finished steel. Owing to the preponderance of open-hearth specifications, the leading interest is able to furnish Bessemer rails, billets, sheet bars and regular bars, both plain shapes and twisted, with reasonably prompt delivery. The general structural and plate situation is unchanged. Sheets are firmer, following the American Sheet & Tinplate announcement. Pig iron appears to be holding its own in this market as regards prices, but there is some pressure to sell spot Southern iron. Scrap prices show further declines. The disposal of 12,000 tons of scrap offered by the Illinois Central was an interesting feature of the week.

Pig Iron.—Inquiry for second quarter iron from local furnaces has brought out a renewal of strength in a somewhat strained situation. A very attractive aggregate tonnage is up for quotations, particularly from malleable iron foundries. Lots of 2000 and 3000 tons are noted, indicating that the larger buyers especially are interested. An inquiry for 1000 tons of Southern iron for like delivery is reported. There is as yet less interest in Southern iron, and the continued maintenance of the \$14 price is largely due to the fact that the leading Birmingham interests are well sold up. Tennessee iron is available at \$13.50, and the furnaces making this quotation are understood to have taken enough business to greatly improve their situation. Spot shipment iron is appearing in sufficient quantity to make its disposal at full prices a matter of some difficulty, and some shading of analysis has been found advisable to save the price. The Thomas furnace at Milwaukee blew in last week and is now ready to resume shipments on its contracts. In the St. Louis district large tonnages of Southern basic are reported to have been placed. The following quotations are for iron delivered at consumers' yards except those for Northern foundry, malleable Bessemer and basic iron, which are f.o.b. furnace and do not include a local switching charge averaging 50c. a ton:

Lake Superior charcoal, Nos. 1, 2, 3, 4....	\$18.00 to \$18.75
Northern coke foundry, No. 1.....	18.50 to 18.75
Northern coke foundry, No. 2.....	18.00 to 18.25
Northern coke foundry, No. 3.....	17.50 to 18.00
Southern coke, No. 1 foundry and No. 1 soft	18.35 to 18.85
Southern coke, No. 2 foundry and No. 2 soft	17.85 to 18.35
Southern coke, No. 3.....	17.35 to 17.85
Southern coke, No. 4.....	16.85 to 17.35
Southern gray forge	16.85 to 17.35
Southern mottled	16.35
Malleable Bessemer	18.00 to 18.25
Standard Bessemer	19.40 to 19.90
Basic	17.75 to 18.25
Jackson Co. and Kentucky silvery, 6 per cent.....	20.40
Jackson Co. and Kentucky silvery, 8 per cent.....	21.40
Jackson Co. and Kentucky silvery, 10 per cent.....	22.40

Rails and Track Supplies.—The pressure for deliveries and the flood of specifications from the railroads are unabated. Duplicating an instance noted last week another railroad specified against its contract to the extent of 22,000 kegs of spikes, 9500 kegs of bolts and 3000 tons of other fastenings. A Western railroad in the market for rails is considering both Bessemer and open hearth, the Bessemer rails being available for earlier delivery but under the disadvantage of freight

from tidewater. We quote standard railroad spikes at 1.95c. to 2.05c., base; track bolts with square nuts, 2.30c. to 2.40c., base, all in carload lots, Chicago; tie plates, \$32 to \$34.50 net ton; standard section Bessemer rails, Chicago, 1.25c., base; open hearth, 1.34c.; light rails, 25 to 45 lb., 1.25c.; 16 to 20 lb., 1.30c.; 12 lb., 1.35c.; 8 lb., 1.40c.; angle bars, 1.50c., Chicago.

Structural Material.—Contract specifications continue very heavy for car structural shapes and the outlook for the local building requirements promises a heavy tonnage. The contract for steel for the new Stevens building, which will take about 6000 tons, is expected to be let this week. Contracts for fabricated steel placed during the week included 984 tons for Armour & Co., awarded to the Hansell-Elcock Company; 1055 tons for a Texas & Pacific Railway Company bridge, taken by the Phoenix Bridge Company; 1100 tons for a Chicago & Alton bridge over the Illinois River, placed with the Wisconsin Bridge Company, and 300 tons for the Portland Railway, Light & Power Company, which went to the Northwest Steel Company. We quote for Chicago delivery, plain shapes, 1.63c.

Extras for cutting to short lengths to be established as a regular store card applicable to structural shapes and angles have been announced by at least one of the local jobbers as follows: All lengths down to 3 ft., free as formerly; from 3 ft. to 2 ft., \$1 per ton extra; from 2 ft. to 1 ft., \$2 per ton; from 1 ft. to 6 in., 20c. per 100 lb.; from 6 in. to 4 in., 35c. per 100 lb., and from 4 in. to 2 in., 50c. per 100 lb. As this extra charge has been under consideration by all the jobbers, it is probable of general adoption. We quote structural shapes from store, base sizes, 2.05c.

Plates.—Several railroads are still in the market for locomotives and various types of freight and passenger cars. Considerable difficulty is being experienced in placing the orders for this equipment to obtain any kind of definite promises from car builders. A number of instances are noted where Western plate users have been forced to send their orders to eastern Pennsylvania mills, paying prices equivalent to 1.83c., Chicago. Jobbing boiler shops, able to stock plates only in limited amount, are generally under the necessity of paying similar premiums in taking their material out of store. For Chicago delivery on contract we quote for plates, base sizes, 1.63c.

In addition to establishing the same extras for cutting plates to short lengths as noted above for structural shapes, a leading Chicago warehouse has adopted the plan of carrying plates in stock and listing them only in standard widths, the lengths varying from 3 ft. to the maximum lengths rolled. Stock lists will thus show plate widths in a manner analogous to structural sizes. We quote for plates out of store, 2.05c.

Sheets.—The stability of the market on sheets has been reaffirmed by the announcement of the leading interest making its prices the maximum quotations now current. In black and galvanized sheets, local mills are in no better position as to delivery. We quote for Chicago delivery in carloads from mill: No. 28 black sheets, 2.53c.; No. 28 galvanized, 3.68c.; No. 10 blue annealed, 1.88c.

For blue annealed sheets, No. 18 gauge and lighter, and for black and galvanized sheets, an advance of \$2 a ton has been announced on material out of warehouse. We have revised our quotations as follows: No. 10 blue annealed, 2.25c.; No. 28 black, 2.90c.; No. 28 galvanized, 4.15c.

Bars.—New business in iron bars continues to come out, the Chicago, Milwaukee & St. Paul being in the market for 1000 tons and another railroad for a similar quantity. The steel bar situation has little in it that is new. The leading interest is in a position to offer reasonably prompt delivery of Bessemer bars, both plain and reinforcing, and sheet bars and billets from its South works. We quote for mill shipment as follows: Bar iron, 1.57½c. to 1.60c.; soft steel bars, 1.58c. to 1.65c.; hard steel bars, 1.60c. to 1.70c.; shafting in carloads, 58 per cent. off; less than carloads, 53 per cent. off.

Following the advances in shafting from mill, new discounts are announced on shafting out of store. For delivery from store, we quote soft steel bars, 1.95c.; bar iron, 1.95c.; reinforcing bars, 1.95c. base with 5c. extra or twisting in sizes ¾ in. and over, and 7½c. extra for smaller sizes; shafting 51 per cent. off.

Rivets and Bolts.—An occasional contract for bolts is noted, although trade is seasonably dull. Deliveries named, however, continue to run from two to four months. Current demand for rivets is sufficient to keep the shops well filled, but concessions from the nominal quotation amounting to as much as \$2 in some instances are not infrequent. We quote from mill as follows: Carriage bolts up to ¾ x 6 in., rolled thread, 75-10; cut thread, 75-5; larger sizes, 70-2½; machine bolts up to ¾ in. x 4 in., rolled thread, 75-10-5; cut thread, 75-10; large sizes, 70-7½; coach screws, 80-10; hot pressed nuts,

square head, \$5.70 off per cwt.; hexagon, \$6.30 off per cwt. Structural rivets, $\frac{3}{4}$ to $1\frac{1}{4}$ in., 2.38c., base, Chicago, in car lots; boiler rivets, 0.10c. additional.

Out store we quote for structural rivets, 2.70c., and for boiler rivets, 2.90c. Machine bolts up to $\frac{3}{8}$ x 4 in., 70-7 $\frac{1}{2}$; larger sizes, 63. Carriage bolts up to $\frac{3}{8}$ x 6 in., 70-5; larger sizes, 65 off. Hot pressed nuts, square head, \$5.30, and hexagon, \$5.90 off per cwt.

Wire Products.—The compilation of totals for the year 1912 shows that year to have been one of record breaking sales in wire products. Shipments also were correspondingly large, despite the tonnage carried over into this year. Current specifications from jobbers, particularly in Southern territory, are again picking up and the manufacturing trade is likewise taking a large quota of plain material. We quote as follows: Plain wire, No. 9 and coarser, base, \$1.73; wire nails, \$1.93; painted barb wire, \$1.93; galvanized, \$2.33; polished staples, \$1.93; galvanized, \$2.33, all Chicago.

Old Material.—Local prices show still further declines, and the large stocks in the yards of melters on which they are making no appreciable inroads offer slight prospect of changed conditions. Deliveries of old material bought in October and November continue to accumulate scrap on track at consumers' yards faster than it can be handled. Purchasers in the market have also been greatly augmented by exchange contracts with railroads, the mills delivering bars in return. One railroad list disposed of last week, which included 1000 tons of No. 1 wrought and several hundred tons of No. 2 wrought, is understood to have been so handled. Foundry grades are also easier as a result of the very limited demand. The current railroad offerings include 1250 tons by the Northern Pacific and 4000 tons by the Union Pacific. The latter list is distributed almost entirely to the Pueblo steel plant and to Kansas City bolt makers. During the week the Illinois Central disposed of 12,000 tons. We quote for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton.	
Old iron rails	\$16.75 to \$17.25
Old steel rails, rerolling	16.00 to 16.50
Old steel rails, less than 3 ft.	14.00 to 14.50
Relaying rails, standard section, subject to inspection	24.00
Old car wheels	16.75 to 17.25
Heavy melting steel scrap	12.50 to 13.00
Frogs, switches and guards, cut apart	12.50 to 13.00
Shoveling steel	12.25 to 12.75
Steel axle turnings	11.00 to 11.50

Per Net Ton.	
Iron angles and splice bars	\$16.00 to \$16.50
Iron arch bars and transoms	16.50 to 17.00
Steel angle bars	12.50 to 13.00
Iron car axles	21.50 to 22.00
Steel car axles	18.50 to 19.00
No. 1 railroad wrought	12.75 to 13.00
No. 2 railroad wrought	12.25 to 12.50
Cut forge	12.25 to 12.50
Steel knuckles and couplers	12.75 to 13.25
Steel springs	13.25 to 13.75
Locomotive tires, smooth	13.75 to 14.25
Machine shop turnings	8.00 to 8.50
Cast and mixed borings	7.00 to 7.50
No. 1 busheling	11.00 to 11.50
No. 2 busheling	8.25 to 8.75
No. 1 boilers, cut to sheets and rings	9.25 to 9.75
Boiler punchings	12.50 to 13.00
No. 1 cast scrap	12.75 to 13.25
Stove plate and light cast scrap	10.50 to 11.00
Railroad malleable	13.25 to 13.75
Agricultural malleable	12.00 to 12.50
Pipes and flues	9.50 to 9.75

Philadelphia

PHILADELPHIA, PA., January 21, 1913.

Quiet conditions prevail in pig iron. Statistically the position favors the seller, but buyers withhold inquiries pending further developments as to prices, which, in some instances, show a weakening tendency. A large volume of business continues to be offered in finished materials, but with the sold-up condition of mills the tonnage that can be entered for early delivery is small. The urgent demand for steel billets continues. Iron bars have been in less active demand. Coke is weaker, particularly prompt furnace, which is in better supply and has sold at 50c. a ton decline. Shipbuilders are interested in the proposed plans of the Bethlehem-Chili Iron Mines Company in connection with the building of ore-carrying vessels to transport its ore from Chili. Old material is quiet and weak, the supply in a number of grades evidently being in excess of the demand.

Iron Ore.—While old negotiations for both domestic and foreign ore are still pending, no definite business is reported. Importations during the week include 3761 tons of Spanish, 2000 tons of Mediterranean, 24,900 tons of Cuban and 2518 tons of Newfoundland.

Pig Iron.—The business transacted last week was comparatively small. Consumers are fairly well covered for near future requirements and are content to await developments. Considerable talk of probable price concessions on standard brands is heard, but so far no selling at reduced prices has been reported by producers in this district. The prices of 25c. to 50c. above the minimum market at which some brands were held are now seldom obtainable, and \$18.50, delivered in this vicinity, flatly represents the market for standard brands of eastern Pennsylvania No. 2 X foundry. Less desirable grades, however, as is the general custom, are available at 25c. a ton under that price. The bulk of the sales in foundry grades have been in small lots for early delivery. A Delaware River pipe maker is still negotiating for pipe iron, but as the buyer's idea of prices is considerably under sellers' quotations no business has resulted. A number of Virginia iron producers have not opened order books for second quarter and are maintaining quotations for No. 2 X foundry, first quarter, at \$16 at furnace, while the leading interest quotes the same for first quarter, but names \$15.50 for second quarter and \$15.75 for first half shipment. Negotiations are still under way for several moderate lots of coke, malleable and charcoal iron. Further inquiry for rolling mill forge iron has developed, quotations being asked on one 2000, two 1000 and one 500 ton lot, for early shipment. Steel making irons are comparatively quiet. There has been no demand for basic iron, while in standard low phosphorus iron sales have been confined to small lots. While the market generally is quiet, the position of the majority of sellers is statistically strong. Many buyers have already taken their January quota and have asked that February deliveries be anticipated. Two furnaces were blown out for repairs during the week—one Worth stack and the furnace of the Delaware River Steel Company—while Meily furnace at Lebanon was blown in. It is the general opinion that buying will be resumed on a larger scale in the near future. The following range of prices is named for standard brands, delivered in buyers' yards in this district during the first quarter and half:

Eastern Pennsylvania No. 2 X foundry	\$18.50
Eastern Pennsylvania No. 2 plain	18.25
Virginia No. 2 X foundry	\$18.80 to 19.00
Virginia No. 2 X foundry, first half	18.55 to 19.00
Virginia No. 2 plain	18.55 to 18.75
Gray forge	17.50 to 17.75
Basic	18.00 to 18.25
Standard low phosphorus	24.50

Ferroalloys.—Heavy deliveries of ferromanganese against old as well as new contracts have materially weakened the spot market, small lot sales of 80 per cent. being made in this district at \$67, and more recently at \$65, seaboard. Prompt is now quoted at the same basis as second half, namely, \$65, seaboard. Some little inquiry for both 50 per cent. and furnace grades of ferrosilicon is reported, although no business has yet resulted. Ferrosilicon quotations are unchanged.

Billets.—The demand continues active, with mills able to accept but a moderate proportion of the business offered, particularly for early shipment. A strong demand is still being made on Eastern mills by Western consumers. Contracts are being entered for second quarter, few sellers having any tonnage available for first quarter shipment. Prompt billets, particularly for forging purposes, command sharp premiums. Prices are strong at \$32, delivered here, for basic open-hearth rolling billets, and \$36 minimum at mill, for ordinary forging billets.

Plates.—A good demand for heavy steel plates continues to come out. Orders are mostly for moderate lots for delivery in the first quarter, although further contracts for second quarter are being entered. Producers are operating at full capacity and consumers are urging deliveries. Considerable inquiry for car plates is noted. Specifications are being freely made against contracts for all classes of plates. Quotations are firm, 1.65c. being named for uncertain extended deliveries, while 1.75c. for sheared and 1.80c. for universal plates, delivered in this district, are named for near future shipments.

Structural Material.—Mills are not seeking business aggressively, being well sold ahead for the near future and unwilling to enter heavy orders for forward shipment. In instances 1.80c., delivered here, continues to be named for second quarter contracts for plain material. The proposed Penn Mutual Life Building, requiring 3000 tons, is still held in abeyance.

Several moderate bridge orders have been placed with Eastern fabricators. A heavy demand for plain shapes continues, particularly for early delivery. Mills are operating at full capacity and prompt shipments are difficult to obtain. Quotations are unchanged. For ordinary delivery in this district 1.75c. is named, although for prompt shipment, when available, up to 2c. is obtained.

Sheets.—The demand continues active, particularly for prompt sheets, for which premiums of several dollars a ton are asked. Mills continue to enter good orders for both prompt and forward shipment. Operative capacity is fully engaged and deliveries are steadily hardening. Western No. 10 blue annealed sheets are firm at 1.90c., delivered here, while Eastern mills making smooth, loose-rolled sheets of the same grade readily obtain 2.05c. for early shipments.

Bars.—New business develops more slowly, particularly in iron bars, which are in better supply, owing to the increasing number of mills in operation. For near future shipment 1.67½c., delivered here, is more freely named, although prompt shipments usually command 1.77½c. Steel bars are in fair demand at 1.85c., delivered, for prompt, and 1.55c. to 1.60c. for extended delivery.

Coke.—The demand has been light and prices generally have sagged. Prompt Connellsville furnace coke has been sold at \$3.75 and \$3.50 at oven. Little has been done in contract coke, quotations for which range from \$3 to \$3.25. A moderate volume of small lot business in foundry coke is reported. Some grades are still held at \$4.50, at oven, although as low as \$4 can be done. The supply of coke generally has been a shade more plentiful. The following range, per net ton, about represents the market for deliveries in buyers' yards in this vicinity:

Connellsville furnace coke	\$4.75 to \$5.75
Connellsville foundry coke	5.75 to 6.50
Mountain furnace coke	4.50 to 5.00
Mountain foundry coke	5.50 to 6.00

Old Material.—The market is quiet. Very little demand for any grade is reported, consumers being well supplied. Open weather conditions have resulted in increased supplies in dealers' hands, and in most grades more is offered than can be absorbed. Heavy melting steel is quiet. Exceptions to the general conditions may be noted in car wheels and old iron axles, supplies of which are apparently limited. Low phosphorus scrap has been sold in small lots at lower prices. Offerings of rolling mill scrap meet with little response by consumers, except at bargain prices. The general market is weak and prices in the absence of business are largely nominal. The following range about represents sellers' ideas for deliveries in buyers' yards in this district, covering eastern Pennsylvania and nearby points, taking a freight rate varying from 35c. to \$1.35 per gross ton:

No. 1 heavy melting steel	\$14.50 to \$15.00
Old steel rails, rerolling (nominal)	17.00 to 17.50
Low phosphorus heavy melting steel scrap	18.50 to 19.00
Old steel axles	20.00 to 20.50
Old iron axles (nominal)	27.00 to 28.00
Old iron rails	18.00 to 18.50
Old car wheels	16.25 to 16.75
No. 1 railroad wrought (nominal)	16.00 to 16.50
Wrought iron pipe	13.25 to 13.75
No. 1 forge fire	12.50 to 13.00
No. 2 light iron (nominal)	8.00 to 8.50
Wrought turnings	11.25 to 11.50
Cast borings	11.00 to 11.50
Machinery cast	15.00 to 15.50
Grate bars, railroad	10.00 to 10.50
Stove plate	11.00 to 11.50
Railroad malleable (nominal)	13.50 to 14.00

Cincinnati

CINCINNATI, OHIO, January 22, 1913. (By Telegraph.)

Pig Iron.—Sentimentally, the market shows considerable improvement. Several of the larger melters are showing a desire to come in for last half requirements, and those who have not already covered are expected to do some heavy purchasing within four weeks. Quite a number of consumers have also lately made small purchases of iron to carry them through the first half. This improvement has not yet had time to stiffen prices and both resale and furnace No. 2 foundry are quoted for prompt shipment at \$13.50, Birmingham basis. However, it is understood that the Alabama furnaces are holding firm at \$14 for any shipment during the first half. In the Hanging Rock district a lot of resale iron that holders were compelled to move has established a price of \$16.50, Iron-ton, but decreasing stocks in that territory, coupled with the increasing demand, lead iron merchants to predict a much firmer market at an early

date. A southern Ohio melter contracted for a round tonnage of Northern No. 2 foundry at \$17, Iron-ton, for third quarter shipment. A northern Ohio firm also took a smaller quantity, at the same price, for last half. Malleable is more active, and 1500 tons was purchased by an Ohio manufacturer for first half and about 2000 tons is expected to be closed in St. Louis territory before the week is over. The Southern Railway Company has out an inquiry for 400 tons of special analysis iron for one of its shops. Ohio silvery irons are in better demand and prices are very firm. Based on freight rates of \$3.25 from Birmingham, and \$1.20 from Iron-ton, we quote f.o.b. Cincinnati, as follows.

Southern coke, No. 1 foundry and 1 soft	\$17.00 to \$17.50
Southern coke, No. 2 foundry and 2 soft	16.75 to 17.25
Southern coke, No. 3 foundry	16.50 to 17.00
Southern, No. 4 foundry	16.25 to 16.75
Southern gray forge	16.00 to 16.50
Old silvery, 8 per cent. silicon	20.70 to 21.20
Southern Ohio coke, No. 1	18.20 to 18.70
Southern Ohio coke, No. 2	17.70 to 18.20
Southern Ohio coke, No. 3	17.45 to 17.70
Southern Ohio malleable Bessemer	17.70 to 18.20
Basic, Northern	18.20 to 18.70
Lake Superior charcoal	19.25 to 19.75
Standard Southern car wheel	27.25 to 27.75

(By Mail)

Coke.—The situation is somewhat easier and the furnaces are not so insistent in demanding shipments as they were a week or so ago. Connellsville 48-hr. leading brands are around \$3.75 to \$4 per net ton at oven for immediate shipment and from \$3.25 to \$3.50 on contract business. Foundry coke is quoted about 50c. a ton higher. Wise County and Pocahontas producers report a better supply of cars, but they are still behind on shipments, as the output is not up to normal. Quotations in these districts range from 25c. to 40c. a ton below the Connellsville prices.

Finished Material.—Although the high water has inconvenienced several of the local warehouses, barges were pressed into use and deliveries are being made and shipments received on almost the usual schedule time. The local rolling mill was shut down for a week on account of the flood, but resumed operations January 20. There are no changes in previous quotations, though a premium is known to have been paid lately on a few small lots of structural material and steel bars. The local warehouse price on steel bars is from 2.15c. to 2.25c. and on steel bars from 2.05c. to 2.15c.

Old Material.—The anticipated improvement did not materialize and prices are weak. Stove plate is probably sagging worse than other classes. The quantity of scrap changing hands hardly justifies revised quotations this week, but the figures given are subject to a small discount. The quotations given below represent what buyers are willing to pay for delivery in their yards, southern Ohio and Cincinnati, and the maximum quotations are dealers' prices f.o.b. at yards:

Per Gross Ton.	
Bundled sheet scrap	\$10.50 to \$11.00
Old iron rails	14.25 to 14.75
Relaying rails, 50 lb. and up	21.25 to 21.75
Rerolling steel rails	13.25 to 13.75
Melting steel rails	11.25 to 11.75
Old car wheels	12.75 to 13.25
Per Net Ton.	
No. 1 railroad wrought	\$11.25 to \$11.75
Cast borings	7.25 to 7.75
Steel turnings	7.75 to 8.25
No. 1 cast scrap	11.00 to 11.50
Burnt scrap	8.00 to 8.50
Old iron axles	18.25 to 18.75
Locomotive tires (smooth inside)	12.00 to 12.50
Pipes and flues	7.75 to 8.25
Malleable and steel scrap	9.25 to 9.75
Railroad tank and sheet scrap	6.75 to 7.25

Cleveland

CLEVELAND, OHIO, January 21, 1913.

Iron Ore.—A number of furnace companies have not yet purchased any ore for 1913 delivery, but these are not expected to come into the market until about the time navigation opens. No sales or inquiries are reported and sellers are not looking for much activity during the next three months. While the high grade ores have been well cleaned up some good ore is still to be had. Owing to the fact that there is very little vessel tonnage that is not under contract to carry ore, some sellers in contracting from now on will add clauses making deliveries subject to ability to secure vessel tonnage and requiring buyers to pay additional freight charges should it be necessary to pay a premium above present rates to secure vessel carrying capacity. We quote prices as follows: Old range Bes-

semer, \$4.40; Mesaba Bessemer, \$4.15; old range non-Bessemer, \$3.60; Mesaba non-Bessemer, \$3.40.

Pig Iron.—A buying movement in a limited way has started in for the last half delivery. Several sales of foundry grades are reported for that delivery at the same prices as are being quoted for the first half. Included in these sales are one or two fairly good sized lots of malleable iron has also been sold for the same delivery. Sellers generally are willing to make sales for the last half at current prices to customers who want to place orders, but they are not inclined at the present time to solicit business for that delivery. A general buying movement for the last half is not expected for some time. There is some inquiry for small lots of foundry iron for early shipment and in the first half. Among the inquiries is one from a Canton consumer for 300 tons of No. 2 for the second quarter. Shipments are heavy and stocks in furnace yards are being further reduced. Prices on Northern grades are generally firm. The weakness in Southern iron continues, No. 2 foundry being quite freely offered at \$13.50, Birmingham, for prompt shipment and for the first quarter. For the first half \$14 still appears to be the general quotation. However, a sale of 200 tons of Tennessee iron is reported to a local consumer at \$13.50, Birmingham, for No. 2 for last half delivery. We note the sale of 300 tons of Southern charcoal iron in the Pittsburgh district at \$25, Birmingham, for the last half delivery. The Struthers Furnace Company expects to blow in late this week its stack at Struthers, Ohio, which has been out of blast for re-lining. For prompt shipment and for the first half we quote, delivered Cleveland, as follows:

Bessemer	\$18.15 to \$18.40
Basic	17.25 to 17.50
Northern No. 2 foundry	17.75 to 18.00
Southern No. 2 foundry	17.85 to 18.35
Gray forge	17.15 to 17.40
Jackson county silvery, 8 per cent. silicon.	20.55 to 21.05

Coke.—Furnace coke for spot shipment is softer and is now being quoted at \$3.90 to \$4 per net ton at oven. Prices for contract and on foundry grades are firm but the market is very dull. We quote standard furnace coke for the first half at \$3.25 to \$3.50. Standard 72-hr. foundry coke is held at \$4 to \$4.25 for contract and \$4.50 for spot shipment.

Finished Iron and Steel.—While consumers are not crowding the mills for shipment as hard as they were two or three months ago, having to some extent adjusted themselves to the condition of placing specifications in anticipation of requirements, the general demand continues quite active both in current orders and specifications and there is considerable inquiry for contracts for such deliveries as mills are able to make. Protection is being secured on material for considerable new work in building and other lines, contracts for which will be placed shortly. Deliveries generally show no improvement. Few of the mills are catching up any on shipments of structural material although it was expected that there would be an improvement in this respect during the winter season. The open winter has permitted outside building work to go along with little interruption and this has resulted in a continual demand for steel bars for reinforcing purposes. Among new structural inquiries is one for 2000 tons for the new municipal lighting plant, Cleveland, bids for which will be received January 31. The Carnegie Steel Company has taken 4500 tons of 90-lb. open-hearth rails for the Wheeling & Lake Erie Railroad. This order includes the necessary Duquesne joints. The same railroad is expected to be in the market shortly for several steel bridges. The Lake Shore Railroad has a new inquiry out for 400 tons for a bridge in Chicago. Prices in all lines are very firm. Sheets are in good demand with a minimum quotation of 2.35c. for No. 28 black and 2.50c. for No. 28 galvanized. There is a good demand for iron bars, which are quoted at 1.60c. to 1.65c., Cleveland mill. Local warehouse prices are 2.10c. for steel bars and 2.25c. for plates and structural material.

Old Material.—There is very little demand, most of the mills having all the scrap they want for the next few weeks. Heavy melting steel is firmer and dealers have advanced quotations on that grade 25c. a ton. Car wheels and axles are also somewhat firmer. Turnings and busheling scrap are weaker, prices on these grades having declined 25c. to 50c. a ton. A Canton, Ohio, consumer is in the market for heavy steel scrap, but little other inquiry is pending and dealers are forced to make concessions to dispose of material on cars. The Union Nut Company has placed an embargo on scrap. There is an abundance of material of all grades but

dealers are not attempting to force sales. We quote, f.o.b. Cleveland, as follows:

Per Gross Ton.	
Old steel rails, rerolling	\$15.00 to \$15.50
Old iron rails	17.50 to 18.00
Steel car axles	18.75 to 19.25
Heavy melting steel	13.50 to 14.00
Old car wheels	15.00 to 15.50
Relaying rails, 50 lb. and over	23.00 to 23.50
Agricultural malleable	12.50 to 13.00
Railroad malleable	14.00 to 14.50
Light bundled sheet scrap	12.50 to 13.00
Per Net Ton.	
Iron car axles	\$22.00 to \$22.50
Cast borings	7.75 to 8.00
Iron and steel turnings and drillings	7.50 to 8.00
Steel axle turnings	9.25 to 9.50
No. 1 busheling	11.75 to 12.25
No. 1 railroad wrought	13.50 to 14.00
No. 1 cast	13.00 to 13.50
Stove plate	10.00 to 10.50
Bundled tin scrap	11.00 to 11.50

Birmingham

BIRMINGHAM, ALA., January 20, 1913.

Pig Iron.—The waiting situation continues. There has been little buying. Carload lots of No. 2 have been sold to local foundries at \$14, while, on the other hand, some small lots have sold at \$14.50. A sale of 300 tons of analysis iron for first quarter delivery was made at \$15 by an interest which has not shaded the \$14.50 level in three months. What the effect will be of the selling of Tennessee iron on the \$13.50 Birmingham basis remains to be seen. It is generally understood that a number of Tennessee furnaces were late in resuming operations on the market's rise and have some accumulations to dispose of. They have an advantage over Alabama furnaces of 50c. to as high as \$1 a ton freight to inland points and thus sacrifice some of this advantage to fill order books. A brokerage firm asserts, however, that there is \$13.50 furnace iron to be obtained in Alabama. It is said that a small accumulation of iron, consisting of about 4000 tons or so, may possibly be had at that figure, but it is strenuously denied that any furnaces are selling current make below \$14, and there is no evidence that they are doing so. The companies holding to the minimum of \$14 and asking \$14.50 are well sold into the future and thus far manifest no disposition to go below \$14, although it is admitted that the cheaper Tennessee iron has affected the trade just as the resale \$13.50 metal has done. Furnacemen declare that any sort of buying movement would soon eat up the Tennessee make and restore firmness. Reports to this effect are now current.

The Tennessee Company has put Alice furnace on basic and is now making more basic than ever before in its history. Car wheel plants report exceptional activity, one Birmingham foundry being booked for the entire year for its standard freight wheel capacity. The local consumption of pig iron appears to be steadily on the increase, reducing the supply available for other markets. Quotations, per gross ton, f.o.b. furnaces, for spot and second quarter, are continued as follows:

No. 1 soft and foundry	\$14.50 to \$15.00
No. 2 soft and foundry	14.00 to 14.50
No. 3 foundry	13.75 to 14.25
No. 4 foundry	13.50 to 14.00
Gray forge	13.25 to 13.75
Basic	14.00 to 14.50
Charcoal	25.00 to 25.50

Cast Iron Pipe.—Orders for upward of 10,000 tons of pipe, including 4000 tons for Kansas City and an equal quantity for Seattle, have been received by Birmingham makers. Small sizes of pipe are in good demand and the aggregate of orders is excellent. Some of the idle capacity will resume operations. The prospect is regarded as improved. Prices quoted have not changed, being \$24.50 for 4 in. and \$22.50 for 6 in. and upward, with \$1 added for gas pipe.

Coal and Coke.—Operations at mines and the delivery of coal have improved, but conditions are still strained in some localities owing to scarcity of cars. Prices show a slight tendency to sag. Foundry coke is still high and the entire make in brisk demand. It is selling around \$4 per ton. Regular movements to Mexico are taking place.

Old Material.—Dealers are experiencing no difficulty in disposing of stocks, owing to exceptional foundry and steel works activity. Wrought and steel scrap and relaying rails are most in demand. Light stove and cast are not such ready sellers. The dealers are seeking replenishment of stocks. Prices remain f.o.b. dealers' yards as follows, per gross ton:

Old iron axles	\$15.50 to \$16.00
Old steel axles	15.50 to 16.00
Old iron rails	15.50 to 16.00
No. 1 railroad wrought	13.00 to 13.50
No. 2 railroad wrought	11.50 to 12.00
No. 1 country wrought	9.50 to 10.00
No. 2 country wrought	9.00 to 9.50
No. 1 machinery cast	11.50 to 12.00
No. 1 heavy melting steel	11.50 to 12.00
Tram car wheels	12.00 to 12.50
Standard car wheels	12.50 to 13.00
Light cast and stove plate	9.50 to 10.00

Boston

BOSTON, MASS., January 21, 1913.

Old Material.—The trade continues to wait for a sufficient volume of buying to give a direct line on prices. Little new material is coming out. The market may be a little weaker, but not sufficiently so to change our quotations, which are prices offered by the large dealers to the producers and to the small dealers and collectors, per gross ton, carload lots, f.o.b. Boston and other New England points which take Boston rates from eastern Pennsylvania points. In comparison with Philadelphia prices the differential for freight of \$2.30 a ton is included. Mill prices are approximately 50c. a ton more than dealers' prices:

Heavy melting steel	\$11.75 to \$12.00
Low phosphorus steel	14.00 to 15.00
Old steel axles	15.00 to 15.50
Old iron axles	23.00 to 23.50
Mixed shafting	14.00 to 14.25
No. 1 wrought and soft steel	11.75 to 12.00
Skeleton (bundled)	10.00 to 10.25
Wrought iron pipe	10.50 to 10.75
Cotton ties (bundled)	10.00 to 10.25
No. 2 light	4.50 to 5.00
Wrought turnings	8.25 to 8.50
Cast borings	8.00 to 8.25
Machinery, cast	13.50 to 14.00
Malleable	11.00 to 11.50
Stove plate	9.00 to 9.50
Grate bars	8.00 to 8.25
Cast-iron car wheels	13.50 to 14.00

St. Louis

ST. LOUIS, MO., January 20, 1913.

The market is showing signs of increasing activity, but it is not yet at a point which arouses particular enthusiasm, though sales representatives are of the belief that the improvement will be maintained, based on the steady continuance of heavy specifications on contracts already placed.

Pig Iron.—There has been some irregularity in pig iron, with representatives quoting prices, in a preliminary way, from 50c. to \$1 higher than it could be bought for if decided demand were apparent or actual sales were involved to any extent. No. 2 Southern foundry, Birmingham basis, can best be quoted, probably, at \$14, though some representatives make the figure \$14.50, and there is good ground for a belief that \$13.50 would get the iron if a purchaser of a considerable amount really insisted on it. Northern iron is in much the same state as previously reported, with the quotations somewhat nominal, though not to be regarded as actually softening. Most of the new business of the week has been in small lots and the chief inquiry is one for 2000 tons of malleable for first half delivery.

Coke.—There is still little tendency to contract for large amounts so far as the greater portion of the consumers are concerned, though there was one sale of 9000 tons of furnace grade by-product coke at a price not ascertainable. Insistence on delivery on contracts and urgency of demands for prompt shipment are very pronounced.

Finished Iron and Steel.—The week brought forward no new large contracts, but the aggregate of business is keeping up in all divisions and from practically all sources. The United Railways increased its order for standard rails to 1500 tons, but aside from this there was no new rail business. In structural material the fabricators show a disposition to get ready for the opening of spring work by getting supplies well ahead, but as matters are at present they are not likely to get deliveries on much more than they are able to consume during the cold weather. Bars are in like position. The agricultural and wagon interests are taking all the material they can get deliveries on. In light rails the lumber and coal interests are taking quite freely. Track fastenings are more active than usual at the season.

Old Material.—There has been a softening since the severe weather of a week ago let up, but this is likely to disappear if severe temperatures again de-

velop with the consequent shutting off of supplies from railroad and similar sources. The mills are buying where they can get material at their own prices, but they are still somewhat independent, as their yards are fairly well filled and for a time there has been something of an embargo on taking deliveries. No lists are expected until the first of the coming month. Relayers continue in fair demand, but have softened a bit with the rest of the market. We quote dealers' prices, f.o.b. St. Louis, as follows:

Per Gross Ton.

Old iron rails	\$14.00 to \$14.50
Old steel rails, rerolling	15.00 to 15.50
Old steel rails, less than 3 ft.	13.50 to 14.00
Relaying rails, standard section, subject to inspection	23.50 to 24.00
Old car wheels	15.50 to 16.00
Heavy melting steel scrap	13.25 to 13.75
Frogs, switches and guards cut apart.	13.00 to 13.50

Per Net Ton.

Iron fish plates	\$12.50 to \$13.00
Iron car axles	20.50 to 21.00
Steel car axles	17.50 to 18.00
No. 1 railroad wrought	12.50 to 13.00
No. 2 railroad wrought	12.00 to 12.50
Railway springs	11.00 to 11.50
Locomotive tires, smooth	12.50 to 13.00
No. 1 dealers' forge	9.00 to 9.50
Mixed borings	7.00 to 7.50
No. 1 busheling	10.50 to 11.00
No. 1 boilers, cut to sheets and rings.	7.50 to 8.00
No. 1 cast scrap	12.00 to 12.50
Stove plate and light cast scrap.	8.50 to 9.00
Railroad malleable	11.50 to 12.00
Agricultural malleable	10.00 to 10.50
Pipes and flues	7.50 to 8.00
Railroad sheet and tank scrap	7.25 to 7.75
Railroad grate bars	9.50 to 10.00
Machine shop turnings	8.75 to 9.25
Bundled sheet scrap	7.50 to 8.00

The German Iron Market

BERLIN, January 3, 1913.

The quiet tone prevailing in the iron trade, by reason of political anxieties and the tightness of the money market, has grown pronounced. The political skies, however, have begun to clear up, and the export trade feels the effects of the improved outlook. In view of this, together with the further fact that stocks of pig iron and semi-finished steel can hardly be said to exist anywhere in Germany, iron men are not at all concerned about the future of the market. It is believed that the scarcity of pig iron will become even more pronounced after the peace negotiations shall have been happily terminated.

Ores and Pig Iron

The market for home ores is firm. It is difficult for producers of high-grade ores to meet the demands of the furnaces. The capacity of the mines has been sold out to the middle of the year; and in the minettes region (Luxemburg-Lorraine) contracts extend in part to even longer dates. Business in foreign ores continues rather sluggish, consumers regarding prices as too high. Ocean freight rates have recently fallen, and this has facilitated shipments of manganese ores from the Black Sea, as well as all Mediterranean ores. Considerable buying of manganese ores has occurred since the drop in freights. In Swedish ores, which are imported almost wholly on long-term contracts, supplementary amounts are being taken to some extent at very firm prices.

The situation as to pig iron remains exceedingly strong. Shipments are heavier than ever, the car shortage having been considerably relieved. From the Luxemburg-Lorraine region it is reported that the demand for basic (Thomas) iron has increased more than had been expected; the shortage of foundry qualities has become extremely marked, and it is even expected to grow worse. The foreign demand for iron there is very brisk at good prices. The market for scrap is in a satisfactory position. The demand has increased, but supplies are also abundant. Nevertheless, prices have recently improved somewhat for several grades, particularly cast.

Steel Shipments Exceed Allotments

In semi-finished steel, shipments continue to exceed the allotments of the mills, which are still struggling with the problem of meeting orders on time. Some of the big Union concerns are compelled to buy extra supplies in addition to their own production, instead of filling their allotments for the open market. Business in beams is quiet, in keeping with the season, but foreign markets continue to buy at good prices.

The demands for heavy steel rails have grown larger, the State railroads having latterly called for

more rapid delivery. This makes it more difficult to meet the increasing foreign demand, on which higher prices are now offered. In light rails the mills have heavy some and foreign orders; and this is also the case with grooved rails, which have been tending higher. Heavy rails for export cost 120 to 125 marks, according to quantity, delivered at port of shipment.

Bars and Plates

In bars the reserved attitude of dealers continues, and during the Christmas week calls for delivery were slacker than hitherto. However, the amount of work in hand is large, and calls for delivery on specifications cannot be met in some cases under three months. The foreign demand has rather increased of late, and higher prices have been obtained on export orders for quick delivery. The foreign demand for good basic steel bars is met at 122.50 to 125 marks f.o.b. seaport. Mills running on iron bars are filled with orders far into the second half-year; the foreign demand is heavy, and the full home price is obtained on export orders—118 marks for ordinary commercial bars, ranging up to 168 marks for the best grades.

Business in heavy plates has grown rather slow, but some business is still coming in. The mills, however, have work in hand beyond the middle of the year, and in ship plates, as mentioned in previous reports, for the full year and more. The export demand has improved.

Wire rods are in strong position, thanks largely to a heavy export demand. Nail mills still complain keenly of American competition, which makes it impossible for them to obtain profitable export orders.

Later Advices Are Favorable

BERLIN, January 9.—The iron market continues in excellent shape, with rather a firmer tendency. The Pig Iron Syndicate has made advances of 2.50 to 4 marks on exports of certain grades to Switzerland. The latest report issued by the Düsseldorf Exchange says that "the pig iron market is very firm, and there is a good demand in other sections of the trade; the arrival of specifications continues brisk."

Considerable attention has again been attracted by the opening of public tenders for steel bars, bands and plates by the State railroad authorities at Hanover. A firm of dealers at Düsseldorf offered bars at 117.50 marks, but Krupp and other manufacturers demanded 124 to 125 marks at the works, and one mill near Hanover asked 130.75 marks. The lowest price on bands made by the same Düsseldorf firm was 142.50 marks, which corresponds to Manufacturers' prices. This firm offered heavy plates at 128.50 marks and the Thyssens at 133 marks at Essen. Thin plates were offered at 144.50 marks at Siegen and angles at 118.50 to 130.50 marks—all by the Düsseldorf house. These were the lowest offers. In some cases, at least, they were evidently speculative.

Heavy Steel Shipments

The shipments of the Steel Works Union last month amounted to 537,000 tons, against 493,000 tons in November and 468,000 tons in December, 1911. The December shipments of semi-finished steel gained about 30,000 tons over November and steel rails about 19,000 tons, while structural shapes dropped off 4000 tons. The shipments of the Wire Rod Association in December amounted to 40,100 tons, against 45,000 tons in November.

A report on conditions in the Silesian district says that the works have more than they can do. The mills have trouble also in getting an adequate supply of skilled labor. In bars and bands they are stipulating several months for delivery. In all classes of steel consumers are urging more rapid delivery than the plants can meet. Makers of steel castings have an abundance of orders and have raised their prices owing to the higher cost of pig. Scrap is not so scarce as in November, but the high prices have been fully maintained, inasmuch as the open hearth plants and foundries continue to make big demands for material.

It is announced that the Steel Works Union, which will hold its next general meeting January 23, will not take up the matter of prices for the second quarter at that time, the situation not being regarded as clear enough yet. All the associations of dealers in beams have just concluded contracts with the Union for the rest of its existence under the present arrangement—that is, to June 30, 1917. The Dillinger Hüttenwerke has joined the Kontor controlling ship plates.

The upward movement in the Belgian trade has again made progress. At the end of last week the home price for bar iron was advanced 5 francs, now

being 175 to 185 francs, and a Brussels dispatch of today tells of an advance on puddling and Thomas pig iron of one-half franc and on foundry grades of 2 francs.

Further Decline in British Iron

Reported Offers of Alabama Pig Iron—
Tin Plates Weaker—Outlook Less Clear

(By Cable)

MIDDLESBROUGH, ENGLAND, January 22, 1913.

Cleveland iron prices have been flattened by speculative sales and realizing, in sympathy with copper. Stocks of warrant iron are 239,245 tons. Recent offers of Alabama iron to Manchester are not liked. Finished steel products are dull. Welsh sheet and tin bars show an easier tendency. German semi-finished steel is unchanged, but demand has practically ceased. Tin plates are weaker. The general outlook seems somewhat obscured. We quote as follows:

Cleveland pig iron warrants (closing Tuesday), 65s. 5d., against 66s. 1d. last week and 67s. 8½d. two weeks ago.

No. 3 Cleveland pig iron, makers' price, f.o.b. Middlesbrough, 65s. 9d., against 66s. 6d. one week ago.

Steel sheet bars (Welsh) delivered at works in Swansea Valley, £5 17s. 6d.

German sheet bars, f.o.b. Antwerp, 112s. 6d.

German 2-in. billets, f.o.b. Antwerp, 107s. 6d.

German basic steel bars, f.o.b. Antwerp, £6 2s., a decline of 1s.

Steel bars, export, f.o.b. Clyde, £8 5s.

Steel joists, 15-in., export, f.o.b. Hull or Grimsby, £7 7s. 6d.

German joists, f.o.b. Antwerp, £5 12s. to £5 15s.

Steel ship plates, Scotch, delivered local yard, £8 7s. 6d.

Steel black sheets, No. 28, export, f.o.b. Liverpool, £9 15s., a decline of 5s.

Steel rails, export, f.o.b. works port, £6 15s.

Tin plates, cokes, 14 x 20, 112 sheets, 108 lb., f.o.b. Wales, 15s.

Buffalo

BUFFALO, N. Y., January 21, 1913.

Pig Iron.—Sales have been somewhat better, aggregating about 10,000 tons of all grades. One producer has shown a disposition to soften prices slightly, with a range of \$16.50 for gray forge to \$17.75 for No. 1 foundry, but others are inclined to adhere more stiffly to the maximum of price schedules in force for some weeks, giving a range of \$17 for gray forge to \$18.25 for No. 1 foundry. Although temporarily easier in tone, the market seems to possess strong underlying features and no permanent recession in prices is anticipated. Melters are still urging rush deliveries of their contract quotas and shipments are going forward from furnaces in record volume to care for the product output of users, which is apparently increasing steadily. Although the majority of consumers are practically covered for their first half requirements, there is still a large aggregate remaining to be placed, which is undoubtedly held back to obtain the utmost advantage from the present sentimental depression or pessimistic feeling evident in some quarters. Furnacemen view the situation with confidence and expect a considerable amount of filling in business. For first half delivery we quote as follows, f.o.b. Buffalo:

No. 1 foundry	\$17.50 to \$18.25
No. 2 X foundry	17.25 to 18.00
No. 2 plain	17.00 to 17.75
No. 3 foundry	16.75 to 17.50
Gray forge	16.50 to 17.25
Malleable	17.25 to 18.00
Basic	18.00 to 18.25
Charcoal, regular brands and analysis	18.00 to 19.00
Charcoal, special brands and analysis	21.75

Finished Iron and Steel.—Some selling agencies report new inquiry for finished products of somewhat lighter volume, undoubtedly owing to the fact that buyers realize the mills are unable to supply material for several months. Nevertheless, many users are showing interest in last half contracts and endeavoring to secure their acceptance. Mills are still holding off on such business and taking new orders for delivery at convenience of mills only, the date of specification to

be prior to the close of second quarter. In railroad materials the demand is heavy, particularly for rails, the local mills being booked ahead for several months on rail orders. Considerable activity is noted in fabricated material for spring delivery. Plans now on architects' boards indicate that there will be a large amount of building in this district the coming summer, requiring good sized tonnages of steel. Inquiries are now out for the structural steel for the new passenger station for the New York Central at Utica, which will take a large tonnage; bids will be received until February 15 by Stern & Fellheimer, architects, New York City. The Monarch Engineering Company, Buffalo, which has the general contract for the coal and ash conveyors at the new water pumping station, Buffalo, has placed the sub-contract for the 150 tons of steel required with the Buffalo Structural Steel Company. The latter company also has contract for the steel for the Pfohl store building at Niagara Falls, N. Y., requiring a moderate tonnage.

Old Material.—The interest of consumers in the market appears to have slackened a little, although some small lot business has been taken on by a few of the foundries tributary to this market and prices, though showing a slight tendency toward softening, are not quotably lower. The Canadian demand for old car wheels during the past two weeks has resulted in a slight advance in that commodity. We quote as follows, per gross ton, f.o.b. Buffalo:

Heavy melting steel	\$14.75 to \$15.25
Low phosphorus steel	17.00 to 17.25
No. 1 railroad wrought	15.25 to 15.75
No. 1 railroad and machinery cast scrap.....	14.00 to 14.50
Old steel axles	16.50 to 17.00
Old iron axles	23.75 to 24.00
Old car wheels	16.50 to 17.00
Railroad malleable	14.00 to 14.50
Boiler plate sheared	15.00 to 15.50
Locomotive grate bars	11.50 to 12.00
Wrought pipe	10.25 to 10.75
Tank iron	10.50 to 10.75
Wrought iron and soft steel turnings.....	8.75 to 9.00
Clean cast borings	8.00 to 8.50

New York

NEW YORK, January 22, 1913.

Pig Iron.—The waiting period in pig iron continues. Sellers are saying of prices, as they have not had occasion to say in many months, that concessions would not increase the amount of business—a remark that is not heard except at a time when the immediate future of the market is in some doubt. While foundries in the Metropolitan district have reported rather less business since the opening of the year, this condition does not apply to the general run of foundries in New York State or in New England. The principal change in the situation from that of the last quarter of 1912 is that buyers are not so much interested in providing for their needs six or eight months ahead. Buffalo furnaces are making some sales, though the amount is not comparable with what was done just before the holidays. There seems to be no interest in basic iron in eastern Pennsylvania, and the feeling in that district is that buying may be further delayed in both steel-making and foundry irons. Current business in this market is chiefly for second quarter, though some deliveries may extend into the third quarter. Virginia irons are still held by the leading producer at \$16 at furnace for No. 2X for first quarter and \$15.50 for second quarter. Little is being done in Southern iron in the Eastern market. We quote as follows for Northern iron at tidewater: No. 1 foundry, \$18.75 to \$19; No. 2 X, \$18.25 to \$18.75; No. 2 plain, \$18 to \$18.25. Southern iron is quoted at \$18.75 to \$19 for No. 1 foundry and \$18.25 to \$18.75 for No. 2.

Structural Material.—A considerable amount of building work is in project, according to reports, but fabricators have not very much scheduled ahead and a number have little over a month's work on their books. The market is generally dull as regards the closure of contracts, and the month of January, 1913, will probably not be different from other first months, which have usually been the low periods in the local structural field. Deliveries have not improved and the price remains strong. Of new work on which it is expected there will be early decisions, mention may be made of 1400 tons for the lithographic establishment of Heywood, Strasser & Voight, Ninth avenue and Twenty-sixth street, and 1700 tons for the Bradstreet printing building. The Payne building, Boston, about 1200 tons, has not yet been placed. Plain material is quoted at 1.66c. to 1.76c., New York, mill shipments,

the former for delivery in the third quarter and the latter figure for, say, three months. From store, the price is 2.25c., New York.

Steel Plates.—About 22,000 cars, it is estimated, will be purchased in the next two weeks. The awards which have been made since the last report include: 1000 hopper cars to the Standard Steel Car Company and 500 hopper cars to the American Car & Foundry Company for the Wheeling & Lake Erie; 8 postal cars to the Pullman Company for the Baltimore & Ohio, 200 box cars to the Haskell & Barker Car Company for the Fort Dodge, Des Moines & Southern, and 200 box cars to the Lenoir Car Company and 100 gondolas and 50 hopper cars to the Cambria Steel Company for the Southern. The demand for plates for use in the immediate territory is still dull, but it requires 5 to 8 weeks for shipment from eastern Pennsylvania mills, with shipments now and then, however, in 10 days, but at prices as high as 2.25c. General quotations for plates remain 1.66c. New York, for mill shipment in the third quarter and 1.76c. for sheared plates and 1.81c. for universal plates in the first quarter.

Iron and Steel Bars.—One interesting inquiry in the market is for 6000 tons of angles for transmission towers for export in May, June and July. The indications are that the order will have to be divided among a number of mills. Movement from jobbers' stocks have eased off, and there are recurring instances of hesitancy in making large commitments. Orders for bar iron and bar iron products are still coming in in larger volume than mill capacity and considerable contracting has been done for the first half at 1.80c. New York. Steel bars are 1.40c. Pittsburgh, or 1.56c. New York, delivery at convenience of mill, and 2.05c. from store. Refined iron bars are generally 1.75c. to 1.80c., New York, and from store, 2.05c.

Cast-Iron Pipe.—Interesting illustrations of the variation in prices obtaining among cast-iron pipe manufacturers are given in the bids which were opened January 15 at Cambridge, Mass., for 150 tons, and on the same day at Lynn, Mass., for 500 tons. On the Cambridge letting the bids were as follows: Lowest, \$26.40 on pipe and \$55 on specials; next, \$27.40 on pipe; next, \$27.65 on pipe and \$50 on specials; next \$28 on pipe and \$50 on specials. On the Lynn letting the low bid was \$26.10 on 4 in., \$24.10 on 6 to 10 in., and \$23.80 on 12 to 16 in.; next, \$25.90 on pipe of all sizes; next, \$26.90 on 4 in., \$25.90 on 6 and 8 in., \$24.90 on 10 to 16 in.; next, \$28.50 on 4 in. and \$26.50 on 6 to 16 in.; next, \$27.50 on all sizes of pipe. Each bid \$50 on specials. The most important lettings now ready for bids are New Brunswick, N. J., 375 tons, January 29; Boston, Mass., 3160 tons, January 27, and 685 tons of high pressure special castings for the new high pressure system February 4. More life is observed in the market, but buyers are proceeding cautiously, apparently being in no haste to close. Quotations on carload lots of 6 in. range from \$25 to \$27 per net ton at tidewater, according to condition of makers' order books.

Old Material.—The market is quiet. Consumers of heavy melting steel scrap are taking in little additional stock and most of them have an abundant supply. Some of the eastern Pennsylvania steel companies are reducing their bids sharply, one of the largest naming \$14 delivered as the best figure it will consider. Rejections are numerous. Old car wheels are firm, and cast scrap is in moderate demand in small quantities, but rolling mill stock appears to be neglected. Dealers' quotations are nominally as follows, per gross ton, New York and vicinity:

Old girder and T rails for melting.....	\$12.00 to \$12.50
Heavy melting steel scrap	12.00 to 12.50
Relaying rails	22.50 to 23.00
Rerolling rails	14.50 to 15.00
Iron car axles	24.50 to 25.00
Old steel car axles	17.00 to 17.50
No. 1 railroad wrought	13.50 to 14.00
Wrought iron track scrap	13.00 to 13.50
No. 1 yard wrought, long	12.50 to 13.00
No. 1 yard wrought, short	12.00 to 12.50
Light iron	5.25 to 5.75
Cast borings	8.50 to 9.00
Wrought turnings	9.00 to 9.50
Wrought pipe	10.50 to 11.00
Old car wheels	15.50 to 16.00
No. 1 heavy cast, broken up.....	12.00 to 12.50
Stove plate	9.50 to 10.00
Locomotive grate bars	9.00 to 9.50
Malleable cast	11.50 to 12.00

Ferroalloys.—The premium lately demanded for spot and nearby 80 per cent. ferromanganese has disappeared and \$65, Baltimore, is now named for both spot and forward delivery. The market continues quiet. Resale ferromanganese, but not a great deal, is still to be had and there are rather definite reports that

offer less than \$65 have been made. Arrivals have been hampered to some extent by the savage storms on the Atlantic. Ferrosilicon, 50 per cent., in a Pittsburgh market, is unchanged at \$75 for carloads; 100 tons, and \$73 for 600 tons and over. A Canadian consumer has just taken 400 tons.

Metal Market

NEW YORK, January 22, 1913.

The Week's Prices

		Cents Per Pound for Early Delivery.		Lead		Spelter	
Copper, New York.		Electrolytic.	Tin, New York.	New York.	St. Louis.	New York.	St. Louis.
Jan. 16.	16.62½	16.37½	50.65	4.35	4.20	7.25	7.10
17.	16.62½	16.37½	50.70	4.35	4.20	7.25	7.10
18.	16.62½	16.37½	50.70	4.35	4.20	7.25	7.10
20.	16.62½	16.37½	50.70	4.35	4.20	7.25	7.10
21.	16.25	16.00	50.50	4.35	4.20	7.10	6.95
22.	16.37½	16.12½	50.50	4.35	4.30	7.10	6.95

Although copper has sold down to 16c. this week, consumers have refrained from active buying. Tin prices hold up under a scarcity of spot metal. Lead is practically unchanged in a dull market. Spelter is lower, and in the East faces competition with foreign metal. Antimony is dull and lower.

New York

Copper.—Following another slump in London on Monday, copper went still lower both abroad and here and sales were made on that day and yesterday at 16c. Consumers appear to lack faith in the market and this probably accounts for their not coming forward more strongly for there has been no heavy buying. The price situation has been dominated more than ordinarily by London influences. Succeeding the upset conditions early last week, the market became somewhat more settled toward the end of the week and sales were made on a basis of 16.50c. delivered in the Naugatuck Valley, cash, 30 days. Then on Monday came the further break abroad, and it was reported and confirmed that the United Metals Selling Company and the American Smelting & Refining Company were competing sharply for foreign business at £75 and £75 5s. delivered, which is close to 16c. cash, f.o.b. New York. To-day a stronger tendency is shown, London having advanced £1 10s. over yesterday's prices. It remains to be seen if the greater strength that is shown at the moment will induce the expected current of buying. That neither American nor European consumers have bought any large volume of copper beyond February is generally accepted, and it is believed that when the reaction comes it will be fairly rapid. Lake copper is entirely nominal at 16.37½c. Electrolytic is quoted at 16.12½c. London quotations for to-day are £70 7s. 6d. for spot and £70 12s. 6d. for futures. Exports continue below normal, the total this month being 16,483 tons.

Pig Tin.—The feature in this market has been the large premium on spot which ruled until yesterday and which is considered to indicate the shortage of the spot supply here. Late on Wednesday of last week some activity set in which was induced partly by the desire of those who were short of tin to cover their needs, although consumers also entered the market not only for spot but to some extent for futures. This activity extended over Thursday. On Monday the market was very dull, but on Tuesday fair interest was shown and about 200 tons was sold. Tin to-day is quoted at 50.50c., which is ½c. higher than yesterday as a result of an advance in London of £2. London quotations to-day are £228 5s. for spot and £226 15s. for futures. The arrivals this month total 2137 tons and there is afloat 3685 tons.

Lead.—The tone of the market is a little easier but not enough so to reflect in prices. Demand is quiet. The price in New York is 4.35c. and in St. Louis 4.20c.

Spelter.—This metal has sagged considerably in price, one active influence being the importation of considerable quantities of German spelter which have been offered and to some extent sold on the Atlantic seaboard as low as 7.05c., or five points under the quotation for prime Western. The New York price of prime Western is 7.10c. and the St. Louis price, 6.95c. to 7c. The demand is sluggish largely because of tariff uncertainty.

Antimony.—In a market that is inactive, antimony quotations range from 0.62½c. to 0.75c. for Cookson's; 0.25c. to 0.50c. for Hallett's, and 8.87½c. to 9c. for Chinese and Hungarian grades. Like lead and spelter, antimony is affected by possibilities of tariff changes, al-

though at the present time consumers are so well supplied that they have no need to enter the market.

Old Metals.—The market continues weak, with a declining tendency. Dealers' selling prices are nominally as follows:

	Cents per lb.
Copper, heavy and crucible.....	15.50 to 15.75
Copper, heavy and wire.....	15.25 to 15.50
Copper, light and bottoms.....	14.25 to 14.50
Brass, heavy.....	9.75 to 10.00
Brass, light.....	7.75 to 8.25
Heavy machine composition.....	13.25 to 13.50
Clean brass turnings.....	9.00 to 9.50
Composition turnings.....	12.00 to 12.50
Lead, heavy.....	4.25
Lead, tea.....	4.00
Zinc, scrap.....	6.00

Chicago

JANUARY 21.—Interest in metals has centered largely about the heavy decline in copper, which affects not only new metal but scrap copper as well. Pig tin shows a firmer tendency. Spelter quotations for immediate shipments are unchanged, but for futures offerings are at marked concessions. We quote as follows: Casting copper, 16.75c.; Lake, 17c., in carloads for prompt shipment; small lots, ½c. to ¾c. higher; pig tin, carloads, 51.50c.; small lots, 53.50c.; lead, desilverized, 4.30c. to 4.35c. for 50-ton lots; corroding, 4.60c. for 50-ton lots; in carloads, 2½c. per 100 lb. higher; spelter, 7.30c. to 7.40c.; Cookson's antimony, 11.25c. and other grades, 10.50c. in small lots; sheet zinc is \$9, f.o.b. La Salle or Peru, Ill., less 8 per cent. discount in carloads of 600-lb. casks. On old metals we quote buying prices for less than carload lots: Copper wire, crucible shapes, 14.75c.; copper bottoms, 13.25c.; copper clips, 14.25c.; red brass, 12.75c.; yellow brass, 10c.; lead pipe, 4c.; zinc, 5.50c.; pewter, No. 1, 33c.; tinfoil, 39c.; block tin pipe, 45c.

St. Louis

JANUARY 20.—Comparatively little interest has been shown in metals, though prices have not fallen very sharply. On lead to-day the quotation was 4.20c.; spelter, 7.15c.; Lake copper, 16.85c. to 17.10c.; electrolytic, 16.60c. to 16.85c.; tin, 50.80c. to 50.95c.; Cookson's antimony, 10.10c. to 10.35c. In the Joplin ore market the top offering of zinc blende was continued at \$50 per ton, and the strength of the market has resulted in great mining activity. The basis range for lots carrying 60 per cent. ranged from \$54 to \$56, the low grades being in somewhat stronger demand. The production has been held down somewhat by the severe weather, but the output of calamine has been affected more noticeably than zinc blende. The best price for the choicest calamine was \$38. The basis range was \$30 to \$34 per ton for 40 per cent. Lead ore showed no change, standing at \$53. On miscellaneous scrap we quote as follows: Light brass, 6.50c.; heavy brass and light copper, 10.50c.; heavy copper and copper wire, 13c.; tinfoil, 36c.; pewter, 25c.; zinc, 4c.; lead, 3.50c.; tea lead, 3c.

Iron and Industrial Stocks

NEW YORK, January 22, 1913.

The stock market has had another bad week. Prices have declined until some stocks have sold almost as low as at any time in the past 12 months. The dominating influence was the fall in the price of copper, which caused all copper stocks to decline, carrying others down sympathetically, but another reason assigned is the probable action of New Jersey in revising its corporation laws, which particularly attack holding companies. The range of prices on active iron and industrial stocks from Wednesday of last week to Tuesday of this week was as follows:

Am. Can. com.....	25¼-28¼	Nat. En. & St. pref.....	92
Am. Can. pref.....	113½-115¼	Pressed Steel, com.....	32-33
Am. Car & Fdy., com.....	51¼-53	Railway Spring, com.....	31¼-32
Am. Car & Fdy., pref.....	116¼-116¾	Railway Spring, pref.....	98¾
Am. Loco., com.....	38¼-40	Republic, com.....	23¾-24½
Am. Loco., pref.....	105	Republic, pref.....	82¼-83
Am. Steel Foundries.....	34	Rumely Co., com.....	87¾-89¼
Bald. Loco., com.....	49-51	Rumely Co., pref.....	98¾-98½
Bald. Loco., pref.....	103¾-104	Pipe, com.....	15¼
Beth. Steel, com.....	35¼-38¼	Pipe, pref.....	55-56
Beth. Steel, pref.....	65¾-69¾	U. S. Steel, com.....	61¼-64¼
Case (J.I.) Co., pref.....	99½-100	U. S. Steel, pref.....	109-109¾
Colorado Fuel.....	31-32	Va. I. C. & Coke.....	52-53¼
Deere & Co., pref.....	99¼-100¼	Westinghouse Elec.....	73¼-75¼
Emer-Brant, com.....	64-65	Am. Ship, com.....	54
Emer-Brant, pref.....	97½-99¼	Am. Ship, pref.....	102
General Electric.....	140¼-183	Chic. Pneu. Tool.....	49¾-50½
Gr. N. Ore Cert.....	37¼-39¼	Cambria Steel.....	50¼-52
Int. Harv., com.....	106½-109	Lake Sup. Corp.....	30-30½
Int. Harv., pref.....	114¼-114½	Pa. Steel, pref.....	93
Int. Pump, com.....	14¾-16½	Warwick.....	104¼-11
Int. Pump, pref.....	68	Crucible Steel, com.....	16
Lackawanna Steel.....	43	Crucible Steel, pref.....	92¼-93¼
Nat. En. & St., com.....	15¼-16¼	Harb. Wk. Ref., pref.....	100¼-101¼

*Ex dividend of 30 per cent. in stock.

The General Fireproofing Company, Youngstown, Ohio, has decided to sell the remaining \$100,000 of its preferred stock. It will be offered at par to stockholders of record of January 1, pro rata to their respective holdings. The capital will be used to pay for additions to the plant already made and to provide more working capital. The company has declared a dividend of 1¾ per cent. on its common stock, payable April 1.

Dividends Declared

The Cambria Steel Company, regular quarterly, 1¼ per cent., payable February 15.

The Crocker-Wheeler Company, regular quarterly, 1½ per cent. on the common and 1¾ per cent. on the preferred stock, both payable January 15.

Personal

Fletcher Collins, formerly with Naylor & Co., Pittsburgh, and previous to that with Rogers, Brown & Co., is now connected with James Pierpont & Co., whose main office is in Philadelphia, as Western sales agent in the pig iron, coal and coke business, with his office in the Oliver Building, Pittsburgh, Pa.

Carl S. Forkum, former superintendent of blast furnaces at the Aliquippa works of the Jones & Laughlin Steel Company, who resigned to accept the position of superintendent of Saxton furnaces and coke works, has since been made general superintendent of blast furnaces and coke works for Joseph E. Thropp, the only individual producer of pig iron in Pennsylvania, and whose operations are now on quite a large scale.

Gustav Rasmus has retired from the active field of engineering and mechanical designing, in which he has been engaged for the past 15 years, to open an office as patent attorney at 2 Rector street, room 1501, New York City.

C. Frank Hathaway, formerly assistant superintendent of the Wyman & Gordon Company, Worcester, Mass., on January 1 became associated with the Park Drop Forge Company, Cleveland, Ohio, as assistant to George C. Gordon, the general manager.

William Ruddy and Charles R. Howe have organized the firm of Ruddy & Howe, foundry engineers, 150 Nassau street, New York, and will engage in the design and construction of foundries, design of special machines and industrial appraisals. Both have had several years of experience with foundries and foundry engineering.

Edward L. Lull has resigned his position in connection with the testing engineering department of the Illinois Steel Company, Gary, Ind., effective January 31, having accepted the position of chief engineer of the Tennessee Valley Iron & Railroad Company.

F. K. Lee, formerly in the sales department of the Birdsboro Steel Foundry & Machine Company, Philadelphia, is now connected with the sales department of the Clipper Belt Lacer Company, Grand Rapids, Mich., traveling in the middle western States.

C. E. Allen has been appointed assistant manager of the detail and supply department of the Westinghouse Electric & Mfg. Company, East Pittsburgh, Pa.

L. H. Jury, formerly chief clerk of the Republic Iron & Steel Company, Youngstown, Ohio, has been appointed assistant to J. W. Deetrick, general manager.

W. E. Hartman, recently managing engineer for the H. Koppers Company, Chicago, and now consulting engineer with offices at 711 Fort Dearborn Building, Chicago, has been retained as consulting engineer by the Republic Iron & Steel Company, in connection with the construction of 68 Koppers by-product coke ovens, work on which has been started. Mr. Hartman has also been retained by the Gas Machinery Company, Cleveland, to take care of its coke oven department.

Charles C. Gano, formerly manager for Dimmick & Co., Uniontown, Pa., and William H. Moore, formerly manager of the coal department of the same firm at its Philadelphia office, have formed a copartnership and opened offices under the name of Gano, Moore & Co., 2016-2017 Land Title Building, Philadelphia, Pa., for the purpose of conducting a general coal, coke and pig iron business.

C. Maglione, manager of the Traversella iron mines of the Societa Anonima Ferriere Piemontesi, Turin, Italy, is

making a tour of the United States in an investigation of methods for the treatment of iron ores.

H. G. Hay, New York, assistant treasurer of the United States Steel Corporation, is making a Pacific coast trip.

Col. George W. Goethals, chief engineer of the Panama Canal, is to be the guest of honor of the Lehigh University Club of Greater New York, at a dinner to be given at the Hotel Astor on Monday evening, January 27.

A. H. Teuchter, president, and S. C. Schauer, vice-president, Cincinnati Bickford Tool Company, Cincinnati, Ohio, sailed from New York this week to see the Panama Canal.

William Lodge, Lodge & Shipley Machine Tool Company, and Charles S. Ginrich, Cincinnati Milling Machine Company, Cincinnati, Ohio, addressed the senior class of the Woodward High School, January 17, on subjects pertaining to the machine tool trade.

E. W. Edwards, president Edwards Mfg. Company, Cincinnati, Ohio, is spending the winter in Florida.

Gilbert H. Pearsall, formerly secretary of Joseph T. Ryerson & Son, in charge of railroad sales, with headquarters in New York City, resigned from that position January 1 to engage in business for himself. E. T. Hendee, assistant to president of Joseph T. Ryerson & Son, is assuming the duties that formerly devolved on Mr. Pearsall.

E. H. Friselle, newly appointed superintendent of the San Francisco plant of Milliken Bros., has arrived in that city preparatory to assuming charge of the works.

William J. Patchell, president Union Iron & Foundry Company, St. Louis, was severely injured recently by a fall down a 20 ft. river embankment while on his way to the office.

Several changes have recently been made in the organization of the Lake Erie Ore Company, dealer in iron ore, 1029 Rockefeller Building, Cleveland, Ohio. E. D. Carter, Erie, Pa., formerly vice-president, has been elected president, filling the vacancy caused by the death of J. H. Bartow. W. D. McKeefrey, Leetonia, Ohio, is now vice-president, and C. G. Sankey, formerly with the Pittsburgh Iron Ore Company, Cleveland, has succeeded P. H. Loneragan as secretary. John Mitchell continues as treasurer.

W. D. Sayle, president Cleveland Punch & Shear Works Company, Cleveland, Ohio, started January 19 on a five weeks' trip to the West Indies.

F. C. Tomlinson has been elected a director of the Kelly Nail & Iron Company, operating a nail factory, and Sarah furnace at Ironton, Ohio, to succeed W. A. Murdock, deceased. The other directors of the company are Oscar Richey, Austin Kelly, Mrs. D. Gregory Wright, D. S. Gray, H. E. Bradley and W. C. Willard of Columbus. The officers elected are: Oscar Richey, president and general manager; Austin Kelly, vice-president, and T. J. Hayes, treasurer.

At the annual meeting of the Marting Iron & Steel Company, Ironton, Ohio, held last week, the following directors were elected for the ensuing year: Col. H. A. Marting, E. O. Marting, W. W. Marting, A. C. Lowry, A. H. Mitterdorf and D. C. Davies, all of Ironton, and James Albert Green, of Cincinnati.

The William Bayley Company, Springfield, Ohio, advises its Eastern customers who have been buying Bayley-Springfield steel sash through the Vulcan Rail & Construction Company that F. B. Hawkins, who has sold the sash for the New York agency, is now manager of the company's Eastern sales office at 303 Fifth avenue, New York City.

The National Iron & Steel Company, Houston, Texas, has closed a contract with the San Antonio & Aransas Pass Railroad for the purchase of 100 miles of 50-lb. relaying rails, aggregating 8000 tons. They were rolled 15 years ago by the Krupp works in Germany.

Two fires which threatened the plant of the Hanna Engineering Works, Chicago, and had the appearance of incendiary attempts, were discovered in time to prevent serious damage, the total loss being under \$500.

Obituary

WALTER CHESSE, Pittsburgh, died January 19, after an illness of several months, aged 73 years. He was born in the Birmingham section of Pittsburgh in 1839, and was associated for years with his father, David Chess, in the nail and tack manufacturing firm of Chess, Smyth & Co. After the death of his father, the firm became Chess, Cook & Co., and later Chess Brothers. Although Mr. Chess had retired from active business, he retained the vice-presidency of the Expanded Metal Companies, successor to the firm of Chess Brothers. He served through the Civil War as a member of Battery G, Independent Pennsylvania Artillery. He leaves a widow, three daughters and one son.

PETER SIMONS, for some years night superintendent of the Braddock works of the American Steel & Wire Company, died recently at Mt. Clemens, Mich., from pneumonia, aged 40 years.

EDWIN D. CHILDS, for 24 years secretary and treasurer of the Kilby Mfg. Company, Cleveland, Ohio, died January 14, aged 73 years.

GEORGE M. SARGENT, Evanston, Ill., died at Atlantic City, January 16, aged 83 years. He became a resident of Chicago about the time of the great fire and founded the Congdon Brake Shoe Company, which became the Sargent Company, subsequently absorbed by the American Brake Shoe & Foundry Company and the American Steel Foundries. He retired from business about 15 years ago.

Red Mountain Ore in Shades Valley

The newspapers in the Birmingham, Ala., district have been commenting lately on developments from diamond drill operations in the red hematite ore field in Shades Valley, a few miles east of Bessemer and seven or eight miles south of Birmingham. One of the reports relates to a core from a drill hole which showed a vein of iron ore 19 ft. 2 in. in thickness with a parting of 4 in. of slate near the center of the vein. The comment on this and other finds is that it has long been known that the ores of Red Mountain continue into Shades Valley, though they are found there at considerable depth. One report, which is not circumstantially verified, is that in the boring of a well some years ago to the depth of 2000 ft. the drill passed through a 100-ft. vein of ore. The fact is cited that the late H. F. De Bardeleben drilled in Lower Shades Valley below McCalla and found a vein 9 ft. thick which outcropped on the western side of the top of Red Mountain.

The Steel Corporation Hearings.—The time for the resumption of hearings in the United States Steel Corporation dissolution suit was changed from Tuesday, January 21, to Wednesday, January 22. It is stated that with the examination of ex-President Roosevelt, who is called to testify concerning the acquisition of the Tennessee Coal, Iron & Railroad Company, and of William E. Corey, the taking of testimony by the Government will be completed. No announcement has been made of the beginning of the examination of witnesses on behalf of the Steel Corporation, but it is expected that the presentation of its case will require about a year.

The rise in the price of bar iron has brought about a peculiar labor situation. Puddlers belonging to the Sons of Vulcan are working for \$6 a ton, while puddlers belonging to the Amalgamated Association are receiving \$6.45 a ton. In several Western bar iron mills men belonging to these organizations work side by side. The Sons of Vulcan insisted on a flat rate, irrespective of the selling price of bar iron, while the Amalgamated Association adhered to the time-honored sliding scale, in settling the wages basis for the year expiring June 30, 1913.

The Anderson Engine Company, builder of marine gas engines, whose main office is in the Marquette Building, Chicago, sends us a photograph showing the partly constructed steel work of the very large building now under construction at Sixty-first place and Archer avenue, Chicago, which is to be its new home.

Pittsburgh and Vicinity Business Notes

Regarding the announcement by the United States Steel Corporation of an advance in wages, mostly in common labor, to become effective February 1, it is not believed that any advance will be given to employees of the H. C. Frick Coke Company, one of the subsidiaries of the corporation. On April 1, 1912, the Frick Company advanced the pay for coal mining from \$1.35 to \$1.44 per 100 bushels and other labor in proportion.

Inquiries for iron working tools and heavy rolling mill machinery in the Pittsburgh district are particularly heavy. The United Engineering & Foundry Company, Mesta Machine Company, A. Garrison Foundry Company and other makers of rolling mill machinery are operating their plants to full capacity and have a great deal of work ahead.

Plans for the erection of 200 rectangular coke ovens of the pusher type are being made by the W. G. Wilkins Company, consulting engineer, Pittsburgh, for the Sykesville Coke Company, Sykesville, Pa. This company is a subsidiary of the Cascade Coal & Coke Company, and will be operated under the management of that company. The new ovens will parallel those of the Cascade Company and additional equipment will be required.

The Valley Mold & Iron Company, Sharpsville, Pa., has taken a contract from the Cambria Steel Company for 1500 to 1800 tons of ingot molds per month, running over all of this year.

All workmen employed by the West Penn Steel Company, Brackenridge, Pa., paid by the hour, have received an advance in wages of about 7½ per cent. About 600 men are benefited. This company states that it has always paid the highest standard of wages and has never had a labor dispute. Workmen paid on a tonnage basis are not affected for the reason that their wages were not reduced during the dull times.

The Republic Rubber Company, Youngstown, Ohio, has placed an order with R. M. Rush, 2137 Oliver Building, Pittsburgh, representing the Kerr Turbine Company, Wellsville, N. Y., for a 2,000,000-gal. centrifugal pump driven by a 125-hp. Economy turbine.

The Orenstein-Arthur Koppel Company, Machesney Building, Pittsburgh, is furnishing 40 30-ton standard gauge sugar cane cars and two locomotives for shipment to Cuba, where they will be used on sugar cane plantations. Last year was one of the best in the company's history, and it has enough orders now on its books to take its entire output of portable track, light locomotives and cars for six months.

The Sharon Steel Hoop Company, Sharon, Pa., is in the market for a cross-compound condensing engine and a 750-kw. generator.

The Brier Hill Steel Company, now building an open-hearth steel plant at Youngstown, Ohio, placed orders last week for its complete pumping equipment. The Wilson Snyder Mfg. Company, Pittsburgh, received orders for two turbine-driven boiler feed pumps, operated by 110-hp. Kerr Economy turbines, and two large hydraulic pumps operating against 1000 lb. pressure. The International Steam Pump Company, New York, received orders for five centrifugal single-stage general supply pumps to be driven by motors.

The new labor law and its enforcement will be discussed at the fourth annual meeting of the New York Association for Labor Legislation, to be held at the Assembly Hall, 105 East Twenty-second street, New York, Saturday afternoon, January 25, at 3 o'clock. Among the speakers are Robert F. Wagner, member of the New York Senate; Abram I. Elkus, counsel of the Factory Investigating Commission of New York State; Dr. W. Gilman Thompson, Frederick L. Hoffman, Prof. Henry R. Seager and H. F. J. Porter.

The No. 1 blast furnace of the Bon Air Coal & Iron Company, at Allen's Creek, Tenn., was blown out December 28 for repairs. Some work is being done on the lining of the furnace and one stove will be entirely relined. The furnace will probably be ready for operation in the early part of February.

Tariff Hearings at Washington

The Free List to Be Taken Up Specifically January 31

WASHINGTON, D. C., January 21.—Following the close of the report of *The Iron Age* last week, the Ways and Means Committee heard the testimony of several witnesses in connection with the proposed revision of the metal schedule, practically all of whom protested against changes in present rates. It is expected that representatives of the steel and iron trade will appear on January 31, at which time the committee will take up the free list specifically, administrative features of the present tariff act, and miscellaneous matters connected with the tariff.

A. Cressy Morrison, of New York City, who stated that he was interested in ferroalloys, made a statement to the committee in which he called attention to the freight rates on commodities affected by the metal schedule, setting forth that under present conditions foreign manufacturers or domestic importers have a lower freight rate than domestic manufacturers and producers, and also that foreign producers have a distinct advantage in getting water power to generate electricity at considerably lower rates than American manufacturers.

The Electro Metallurgical Company, New York and Philadelphia, manufacturer of ferroalloys, said: "We confidently assert that our contention that the existing rates of duty provided for in paragraph 184 do not represent protection, but are merely revenue producing, and that our request that these rates be not lowered in any revision of the metals schedule, are both logical and reasonable, not only from our standpoint, but from that of the Government. We therefore most earnestly request that these rates be not lowered, but, if they are to be changed in order to produce the maximum amount of revenue, that they be made uniform at 25 per cent. ad valorem. Such a rate will do no harm to any American industry and will work no injustice to any consumer."

E. L. Hang, secretary United Steel Company, Canton, Ohio, said: "We believe that if the present tariff schedules are lowered all of the iron and steel manufacturing plants will in due course be forced to reduce wages. Our first objection is to the lowering of the present duty on iron and steel plates. The present rate of \$6 per ton is barely enough to provide protection to the plate manufacturers. If protection is to be given to the American manufacturers, the present duty on plates should not be lowered. We next object to the lowering of the duty on billets, slabs and sheet bars. The present duty is seven-fortieths cent per pound, or \$3.50 per net ton. This duty as it stands is not adequate protection. It is very much less than it was in previous tariff schedules, and it should not be decreased."

Edwin K. Bacon, manager Globe Steel Company, Mansfield, Ohio, manufacturer of round iron shot for sand blast, declared that "if the duty goes down to 20 per cent. ad valorem as proposed; we will go out of business, and the entire supply of shot will be imported."

The Jones & Lamson Machine Company, Springfield, Vt., protested against the proposal to put machine tools on the free list, and stated that under present conditions German manufacturers can put their goods on the American market at 35 per cent. less than American manufacturers of machine tools, and in conclusion said: "This competition has got to be met by a reduction of the labor costs in America, a thing which we believe to be disastrous to the best interests of the mechanics of Vermont. With the development of her latent energy in water power, Vermont must in the future grow industrially. It is her salvation, and as a Vermonter who believes in the future of Vermont, we ask your careful consideration of this subject and your best efforts toward such legislation as will keep the machine-tool industry of Vermont on a living basis."

R. E. Jennings, president Carpenter Steel Company, Reading, Pa., asked that crucible and other high-grade steels be placed in a separate paragraph and made dutiable at a rate not less than the present law, he said, in part: "The crucible steel industry in itself is not a large one, producing only about 100,000 tons of finished steel per annum, with a market value of about \$18,000,000, and employing about 8000 men. There are in this country about 20 firms and companies melting crucible steel, with plants scattered from Bridgeport, Conn., in the East, to

Chicago in the West, all engaged in active competition and with no price agreements."

The Columbus Iron & Steel Company, Columbus, Ohio, protested against any reduction in the tariff on pig iron, or, as expressed in the tariff act, "iron in pigs." The statement of this company was in part as follows: "Do not reduce the tariff on pig iron to the detriment of small operators and to the benefit of the large corporations and steel companies. Do not reduce the tariff on scrap iron or steel, for every ton of scrap imported displaces a ton of pig iron. With little exception the large steel-making companies are not directly interested in the tariff on iron in pigs. These companies use hot metal direct from the blast furnace. Of those before Congress who are working for the reduction of tariff on iron in pigs and scrap iron and steel, a large proportion are influenced by the hope of gaining popular good will by attacking the large steel corporations. In this they are evidently ignorant of the fact that users of hot metal for various reasons could not be supplied by importation. Iron in pigs must be imported cold, not hot."

The Schatz Mfg. Company, user of machine tools, Poughkeepsie, N. Y., said: "The Underwood bill of 1912 placed machine tools in the free list under the metal schedule. Such treatment was just to the importer and the American purchaser and was to the benefit of the public. The value of importations has been so small up to the close of the year 1912 that the question of revenue does not enter into consideration."

Walter Laidlaw, representing manufacturers of pumping machinery, stated that a cut in present tariff rates meant a cut in wages in the industry he represented. He said in part: "Since the costs of our raw materials are equal here and abroad; since whatever mechanical improvements and methods of manufacture which may be developed are equally open to adoption by the domestic and foreign manufacturer; since the efficiency of the operatives in the most advanced foreign countries is equal to our own; there is but one recourse left to the American manufacturer to bring about a further material reduction in the costs of production, namely, the lowering of the American wage rate to the rates prevalent in foreign countries, with the necessary decline in the standard of living and well-being which accompanies the lower wage rate."

J. T. Rose, of the Atlanta Steel Company, Atlanta, Ga., said that so far as the products of his company (hoops, cotton ties, etc.) were concerned, the proposed rates would turn the market for them over to the foreign producers.

Arthur V. Davis, representing the Aluminum Company of America, Pittsburgh, urged that the present duty on aluminum is a proper duty and requested that it be retained. He said: "The Aluminum Company of America is not a merger or combination. It is the creator of the aluminum business in this country and has itself built all the plants that it operates. The Aluminum Company of America has always paid small dividends and put its profits back into the business, with the idea of taking care of the growing industry which it has taken pride in creating and encouraging."

W. L. C.

To Cure a Dusty Concrete Floor

The Aberthaw Construction Company, Boston, Mass., contracting engineer, specializing in concrete, recommends the following method of curing a dusty concrete floor: Get the surface entirely dry, then paint it with a mixture of boiled linseed oil thinned with gasoline. Give it several coats, until the oil shows glossy on the top. The theory of this is that the linseed oil, having been boiled, has lost most of its volatile components and is practically permanent. The gasoline thins this down enough so that it will strike into the pores. A little experimenting will show the proper proportions. The thinner it is, the more coats will be required and the deeper it will strike in. The floor that is making serious trouble with dust can often be cured with very little trouble and expense in this way.

Langford, Bacon & Myers, dealers in railroad and contractors' equipment, Rialto Building, San Francisco, Cal., have entered into a contract with the Lauth-Juergens Motor Car Company, Fremont, Ohio, under which they will act as Pacific coast distributors for the Lauth-Juergens 1, 2, 3 and 5-ton capacity trucks and will conduct the business in conjunction with their other large agencies.

The Concrete Industry's Use of Iron and Steel

The sixth Chicago Cement Show held in the Coliseum January 23 again illustrated strikingly the new field of machine tooling being opened to the iron foundry and machine shop by the development of the concrete industry. With the larger use of concrete a greater variety of machinery becomes necessary. This equipment involves plate work and castings that run well up into tonnage. The Wheeling forced feed crusher, only recently offered to the trade by the Wheeling Mold & Foundry Company, is typical of an expansion in this field which can be met more profitably by existing foundries and machine shops than by new companies incorporated to specialize in this equipment. The development of the use of concrete has been very large in the direction of molded blocks, structural and decorative forms and brick. For these, molding machinery in diverse designs is appearing. The demand for both hard and soft steel reinforcing bars and for expanded metal and wire forms has made these products important items in the rolling mill output, while even the sand companies, whose outlet formerly was limited to the foundry, have found a wider field in the requirements of concrete mixtures.

Blast Furnace at Rusk, Texas, Now Leased

AUSTIN, TEXAS, January 18, 1913.—H. A. O'Neill of Atlanta, Texas, as trustee for a syndicate of Philadelphia, Pa., has signed a contract for the lease of the State's blast furnace and pipe foundry, situated at the penitentiary at Rusk, and the first instalment of \$1,666 of the annual rental of \$5,000 has been paid. The syndicate is given permission to purchase iron ore from the State's holdings. The lease is for two years, with an option to extend for an additional four years. The contract does not provide for the use of convict labor in the iron works, but it is expected that what ore is mined from the State's lands will be done by convicts under the supervision of the penitentiary authorities. It is announced by Mr. O'Neill that the syndicate has spent \$250,000 cash in acquiring iron ore lands in eastern Texas and that \$20,000 will be spent in improving the plant at Rusk. Under the terms of the contract the furnace must be in operation within six months.

The operations of this syndicate are said to have no connection with the large iron ore development work that is now being carried on in Cass County by Charles M. Schwab and associates.

Samuel D. Clyde and Clarence A. Allison have been appointed joint receivers of the A. P. Witteman Company, Chester, Pa., manufacturer of forgings. The assets are stated as being far in excess of the liabilities; internal dissensions and lack of working capital being given as the cause of the company's difficulties, which are therefore believed to be temporary. The receivers will operate the plant.

At the annual meeting of the St. Louis Foundrymen's Club last week R. A. Bull, superintendent Commonwealth Steel Company, was elected president; William Hammel, vice-president; C. R. Rook, secretary; W. S. Gemmer, treasurer; executive committee, A. G. Kaiser, Charles Barker, J. E. Balmer, Carl Krutzsch and T. J. McDermott.

An item published in the issue of *The Iron Age* of December 26, stating that the Oxweld Acetylene Company, Chicago, was about to build a plant at Detroit, Mich., for which an expenditure of \$500,000 was contemplated, is an error. The company referred to states that it is not interested in any such project.

The output of pig iron in Belgium in the first eleven months of 1912 was 2,136,850 metric tons, against 1,919,090 tons in 1911. Of the 1912 output 2,001,870 tons was steel-making iron. The number of furnaces in blast December 1 was 49 as compared with 44 on the corresponding date of 1911.

The Meily furnace of the Lebanon Blast Furnace Company, Lebanon, Pa., was blown in January 17. It has a capacity of 50 to 60 tons per day.

The Worth Brothers Company, Coatesville, Pa., has blown out one of its blast furnaces for needed repairs.

November Iron and Steel Exports and Import

The report of the Bureau of Foreign and Domestic Commerce, Department of Commerce and Labor, for November shows an increase in point of value in both the exports and imports of iron and steel, as compared with the figures for October. The total value of the exports of iron and steel and manufactures thereof, not including iron ore, in November was \$26,406,425 against \$25,273,059 in October, while the value of similar imports was \$2,793,448 in November, as compared with \$2,773,916 in October.

The exports of commodities for which quantities are given total 233,742 gross tons in November against 250,746 tons in October, and 187,553 tons in November, 1911. The details of the exports of such commodities for November and for 11 months ended with November, compared with the corresponding periods of the previous year, are as follows:

Commodities.	November		Eleven months	
	Gross tons.	Gross tons.	Gross tons.	Gross tons.
	1912.	1911.	1912.	1911.
Pig iron	25,278	8,147	248,665	109,858
Scrap	7,507	4,406	96,182	73,929
Bar iron	1,472	1,581	19,695	16,668
Wire rods	5,648	2,511	58,039	18,716
Steel bars	23,033	8,674	191,863	116,417
Billets, ingots and blooms, n.e.s.	18,949	13,871	273,364	216,832
*Bolts and nuts	1,575	.....	18,395	.....
*Hoops and bands	1,186	589	111,142	2,932
*Horsehoes	132	.....	1,408	.....
Cut nails	329	1,492	8,771	10,475
*Railroad spikes	1,119	.....	15,509	.....
Wire nails	3,355	4,446	64,048	44,565
All other nails, including tacks	323	1,168	7,821	12,162
Pipes and pipe fittings....	20,658	17,421	231,517	180,897
*Radiators and cast-iron house heating boilers..	846	408	5,272	3,678
Steel rails	31,947	25,140	411,194	398,000
*Galvanized iron sheets and plates	10,357	.....	159,685	.....
*All other iron sheets and plates	2,125	16,175	121,664	114,691
*Steel plates	21,242	.....	150,721	.....
*Steel sheets	11,898	22,585	116,906	213,820
Structural iron and steel..	21,450	28,174	262,949	205,765
Tin andterne plates....	4,654	5,056	77,159	54,729
Barbed wire	8,521	13,879	89,289	88,741
All other wire	10,138	11,830	137,976	118,488
Totals	233,742	187,553	2,712,534	2,001,363

*Included in "all other manufactures of iron and steel" prior to July 1, 1912.

†Figures cover period since July 1.

‡Included in "all other manufactures of iron and steel" from July 1, 1910, to June 30, 1911.

§Not separately stated prior to July 1, 1912.

**Included in "all other manufactures of iron and steel" prior to July 1, 1910.

‡‡Figures are for six months, January to June, inclusive.

The imports of commodities for which quantities are given total 24,152 gross tons in November against 25,557 tons in October and 13,879 tons in November, 1911. Details of such imports for November and for 11 months ended with November, compared with the corresponding period of the previous year, are as follows:

Commodities.	November		Eleven months	
	Gross tons.	Gross tons.	Gross tons.	Gross tons.
	1912.	1911.	1912.	1911.
Pig iron	14,318	8,346	117,263	134,664
Scrap	3,668	146	20,900	16,623
Bar iron	2,278	1,943	23,505	25,122
*Structural iron and steel	364	196	2,866	1,352
Billets, bars and steel plates, n.e.s.	1,570	1,503	17,000	27,649
*Steel rails	513	122	3,585	1,271
Sheets and plates	239	138	3,096	2,074
Tin andterne plates....	97	246	1,881	13,689
Wire rods	1,105	1,239	13,738	18,801
Totals	24,152	13,879	203,839	241,254

*Included in "all other manufactures of iron and steel" prior to July 1, 1911.

The imports of iron ore in November were 163,017 gross tons against 202,125 tons in October and 128,019 tons in the month of November, 1911. The total importations of iron ore for 11 months, ended with November, were 1,904,594 gross tons against 1,662,830 tons in the corresponding period of 1911.

The total value of the exports of iron and steel and manufactures thereof, not including iron ore, for 11 months ended with November, was \$265,377,556, against \$220,032,492 in the corresponding period of 1911. The total value of the imports of iron and steel and manufactures thereof, not including iron ore, for 11 months ended with November was \$26,679,224 against \$26,690,333 in the corresponding period of 1911.

Axioms Concerning Manufacturing Costs

A Summary of the Views Now Generally Held Relative to the Principles which Underlie Industrial Accounting

BY HENRY R. TOWNE

Three factors enter into the cost of each and every article of manufacture; namely, materials, labor and expenses. These constitute a tripod, a three-legged stool, which cannot stand if one of these legs be omitted. They may, and do, vary in dimension, but all three are invariably present, and a "cost" which omits any one of them is incomplete and fallacious. The formula is

$$L + M + E = C$$

in which *L* represents labor, *M* materials, *E* expenses and *C* cost. In this primary division the item "labor" includes all labor entering directly into the product, the item "material" all material entering directly into the product, and the item "expenses" (often called overhead charges, or simply overheads) all other labor, material and expenditures of every kind whatsoever.

Axiom 1. Every cost includes three fundamental factors: labor, material, expenses.

In most cases, however, the expenses, or overheads, divide naturally into two groups:

1. Manufacturing expenses—those incident to the operation of the factory or mill; that is, those incurred in utilizing productive labor and material, and in bringing the product up to the point where it is ready to be sold.

2. Commercial expenses—those incident to the commercial department of the business, including administration, salesmen, advertising, office expenses, etc.; that is, those incurred in distributing and selling the finished product.

It is highly expedient that these two should be segregated, so that each may be studied separately.

Axiom 2. The expense factor should be split into two parts: manufacturing, commercial.

Letting the symbol *Me* represent the former, and the symbol *Ce* the latter,

$$L + M + Me + Ce = C$$

But a more convenient and indicative form of presenting these elementary facts, one which the writer has used for many years, is the following:

L = productive labor

M = productive material

PC = prime cost

Me = manufacturing expenses

SC = shop cost

Ce = commercial expenses

AC = actual cost

If preferred, the foregoing facts may be expressed by the following formulae:

$L + M = PC$ or prime cost

$PC + Me = SC$ or shop cost

$SC + Ce = AC$ or actual cost

Axiom 3. A manufacturing cost has three phases: prime cost, shop cost, actual cost.

On the appreciation and intelligent use of these facts hang all the laws of good business and the profits, for no business can long be operated successfully without a correct knowledge of costs, nor can that be had without a clear grasp of fundamental principles. The competitor most to be feared, while he lasts, is one who does not know his costs, nor understand how to obtain them.

Axiom 4. Accurate cost information is vital to good management.

Simple as are these elementary principles, their correct application in each given case is difficult, and calls for great care and intelligence. To draw correctly the line

between productive and non-productive labor and material, through each of the successive stages of a productive industry, requires the combined skill of the expert manufacturer and the expert industrial accountant; the former knowing accurately all the details of the manufacturing or productive processes, and the latter knowing equally the proper methods of combining and using the recorded facts to yield the desired information. For example, what constitutes productive labor? In the case of a machinist operating a lathe, clearly it includes his wages while his lathe is turning out product and also while it is standing still during the time he is dressing the tool to do the work properly. But if the tool-dressing is done for him, as it is under good modern practice, how shall the time and wages of the tool-dresser be classified? So as to productive material. Shall the tool, the file, the waste, the oil, which are consumed or used up in making the product, be classified as productive or as non-productive material? The answers to these questions depend on the surrounding facts in each case, and are as varied as the cases are infinite in number and variety. The writer is not attempting here to answer such questions, but merely to point out and emphasize underlying principles. This much is clear, that every individual item of expenditure, large and small, must ultimately classify under one of the three great heads above referred to—labor, materials or expenses—and that profit or loss is the difference between actual cost and the net price realized.

Axiom 5. Accurate costs imply the correct classification of every expenditure.

The distribution of actual costs among these heads, or, preferably, into the four groups or divisions indicated above, varies widely in different industries and with different products. This is illustrated by the following table, relating to four distinct lines of actual product, in which the several elements have been reduced to terms of the actual cost of the product when finished and sold.

	Nos.	1	2	3	4
<i>L</i> = productive labor	28	17	29	19	
<i>M</i> = productive material	38	33	25	37	
<i>PC</i> = prime cost	66	50	54	56	
<i>Me</i> = manufacturing expenses	24	20	28	22	
<i>SC</i> = shop cost	90	70	82	78	
<i>Ce</i> = commercial expenses	10	30	18	22	
<i>AC</i> = actual cost	100	100	100	100	
Total expenses (that is, <i>Me</i> + <i>Ce</i>) =	34	50	46	44	

The figures in the above table illustrate the hopeless state of mind of manufacturers, some of whom still survive, who delude themselves by the belief that the sum of labor and materials (prime cost) represents the actual cost of the product, and that the difference between that and the selling price is profit. They show, on the contrary, that in the four examples to which the figures relate the prime cost constitutes only from one-half to two-thirds of the actual cost, and that the expenses, or overheads, incident to conducting the business and marketing the product, contribute from one-third to one-half of the total or actual cost. It seems probable that, if the facts concerning all manufacturing industries could be ascertained and averaged, the "three-legged stool" would be found to stand nearly level, its three legs being approximately of equal length, although differing widely in individual cases.

All cost accounting should aim to segregate charges wherever this can be done accurately. Thus the major part of the items constituting productive labor and material can and should be charged directly to their respective accounts, *L* and *M*.

Axiom 6. Every productive expenditure should be charged directly to its proper account.

All other items, however, which cannot be so segregated must be aggregated into one or several groups and

*A paper presented at the New York meeting of the American Society of Mechanical Engineers, December, 1912.

their cost apportioned among the proper accounts on some carefully determined but necessarily arbitrary basis.

Axiom 7. All non-productive expenditures should be properly grouped for final distribution.

Manufacturing expenses may be apportioned as a ratio or percentage of labor L , of material M , or of labor and material $L+M$. The usual bases are either L or $L+M$. The writer believes that in most cases the closest conformity to actual facts will be attained by distributing manufacturing expenses in the ratio of productive labor, hand and machine, because usually the volume of indirect expenses of works operation will be far more influenced by the pay-roll, that is, by the number and kinds of employees, than by the materials bill, that is, the amount paid for the material of production. Moreover, the former is relatively stable, while the latter fluctuates with market changes. Therefore it is advisable that Me should be a function of L , that manufacturing expenses should be apportioned as a percentage of productive labor, although in some cases they may properly be apportioned per machine, or per unit of floor space.

Axiom 8. The normal basis for distributing manufacturing expenses is productive labor.

Commercial expenses may also be apportioned as a percentage of L , of M , or of $L+M$, and frequently are; but more properly they should be apportioned on the basis of shop costs, $L+M+Me$. The reasons for this are conclusive. Production and selling are two separate and distinct processes. The former brings the product to the point where it is completed and ready for sale; the latter then takes it over and effects the sale. The expenses incurred in each process are for its use only, and have no natural relation to the needs and uses of the other. To illustrate this, take the case of a manufacturer of cotton cloth who sells his entire product through a commission house or broker. Clearly his whole commercial expense account is covered by the commission he pays to his selling agent, and this bears a definite ratio to his shop cost; that is, to the cost of his product ready for sale. Now, take the case of another manufacturer of cotton cloth, who maintains his own selling organization and through it distributes his product. Clearly his commercial expenses offset the commission paid by his competitor, and equally bear a definite ratio to his shop cost. Both are most accurately stated and apportioned as a percentage of the shop cost, the cost of the product ready for sale. Therefore commercial expenses Ce should be distributed as a percentage of shop cost, $L+M+Me$.

Axiom 9. The normal basis for distributing commercial expenses is shop cost.

When the product is simple and homogeneous, for example, such as pig iron or cotton cloth, it will suffice for all manufacturing expenses and one other for all commercial expenses; but when it is diverse or complex, each of these should be sub-divided into one for each department or for each distinct class of product. In effect, such a business is an aggregate of several businesses, some of which may yield better results than others, or may fluctuate more widely, and a proper accounting system should show the results of each sub-division or department separately, as well as the combined result of all. Hence arises in many cases great complexity in cost accounting, and corresponding need and opportunity for the skilled industrial accountant.

Axiom 10. An accounting system should show results both by departments and by totals.

In some cases the entire product consists of a single staple article, or group of articles, for which there is a constant demand and, at some price, a sure sale, such as pig iron, window glass, cotton cloth, etc. In other cases the product must conform to the specifications of the customer, and therefore cannot be made up in advance of orders, as in shipbuilding, carbuilding and the construction of buildings. The former is commonly designated as a stock product, and the latter as contract work. The difference between these may be expressed as follows, viz.:

A stock product is one which is made first and sold afterwards.

A contract product is one which is sold first and made afterwards.

Cost accounting is usually more complex and difficult in the case of contract work than in that of a staple or stock product.

Axiom 11. A contract product may require a more complex accounting system than a stock product for the accurate determination of costs.

The expenses of general administration overlap the manufacturing and the commercial divisions of an industrial business. Many items can and should be definitely charged to one or the other. Others may arbitrarily be apportioned between them; as, for example, the salary of an official who devotes 70 per cent. of his time to one and 30 per cent. to the other. All others must be aggregated into groups for distribution by the methods adopted, as above, for distributing such expenses; as, for example, by percentages of productive labor or of shop costs. Expenditures of this kind are infinite in size, kind and number, and call for great skill and good judgment in their classification, which should be determined in advance by a clearly defined code, not left for haphazard decision by subordinates. Such a code, based on intimate knowledge of the business, on a clear perception of the information the code is designed to yield, and on sound accounting principles, is an indispensable prerequisite to the accurate determination of costs, and equally to the intelligent conduct of any manufacturing business.

Axiom 12. An accounting system should be embodied in a code of instructions, for the guidance of those responsible for its operation.

For best convenience a code should provide symbols to represent the various accounts and their many combinations. For this purpose the writer for many years has used a system of letters and numbers which possesses great convenience. Letters are used to designate important departments and accounts, the significance of each letter depending on its place, as in decimal notation, in the symbol. Thus, the first letter may indicate a department, the second a sub-division of it, and the third a room or smaller unit. Stated numbers are used to indicate accounts relating to expenses of the various kinds or groups. Such a symbol is shown by the following example, viz.:

BAC 10

in which B represents the department, or the class of product, against which the item is to be charged; A the shop in which the work is done; C the job, or machine, by which it is done; and 10 the kind of expense to which the charge relates, such as repairs of the machine, foreman's wages, etc. These symbols and an explanation of their meaning and use are printed in a small book of pocket size, copies of which are furnished to all concerned. In this way a correct classification of every charge is made at the time of original entry, after which tabulation and aggregation of original charges follow automatically in accordance with the predetermined plan.

Axiom 13. Symbols are better than titles for recording charges in an extensive accounting system.

In any business certain expenses or losses occur from time to time which are unusual or abnormal. These may be termed "extraordinary expenses," and require special consideration. As examples of these may be cited a serious loss by fire, a curtailment of product by a strike, an abnormal loss through bad debts, an increase or decrease in value of land, etc. The loss, or profit, thus arising must of course be covered into the treasury, but this may better be done through a debit or credit to the surplus account than through a charge to the profit and loss account of the current year, for the latter plan would distort the statistical record of the year by including in it items not common to normal years. The best plan is to charge to the account of each year only the items which are normal, and to charge those which are abnormal to the surplus account. The proper purpose of the annual account is twofold, (a) to show the results of the year's operations, and (b) to contrast these results with those of preceding and succeeding years. On the other hand, all extraordinary gains or losses must be accounted for, and this may best be done through the surplus account. In this way both purposes are accomplished.

Axiom 14. Extraordinary gains or losses, in order not to distort the statistical value of the annual profit and loss record, should be covered into the surplus account between the closing of the books for the old year and the opening of the books for the new year.

Interest on borrowed capital is a distribution of profits, not an expense, although often erroneously treated as the

latter. To illustrate this, suppose the case of two manufacturers, A and B, each having \$200,000 invested in his business and each realizing 10 per cent., or \$20,000, net profit available for dividends on a year's business. All of A's capital is contributed in cash, while B has only \$100,000 of cash capital, and another \$100,000 of borrowed capital, on which he pays 5 per cent. interest. At the close of the year A is in position to pay \$20,000 in dividends to his stockholders, a 10 per cent. return on their investment, but B, after paying \$5,000 as interest, is in position to pay \$15,000 in dividends to his stockholders, a 15 per cent. return on their investment. Evidently the actual profits from the operations of the year are the same in each case, only the ownership of the capital invested and the distribution of the profits being different. The accounting system should show the actual profit realized, regardless of its distribution to the owners of the capital invested in the business. On the other hand it is expedient that interest on temporary loans, and on time purchases if availed of, rebates and discounts of customers' notes, should be treated as current expenses, normal to the conduct of the business. In like manner discounts earned by cash payments should be treated collectively as part of the current earnings of the year, or else be covered into the net costs of purchases.

Axiom 15. Interest on borrowed capital should not be treated as an operating expense, but should be charged direct to the profit and loss account of the year.

Interest on all capital invested in a business may or may not be deducted before stating the final profits of the year. Here no principle is involved, but merely convention or individual preference. Usage, however, has practically determined that it shall not be deducted; that the final, or net, profit should indicate the return on capital, the amount which capital has earned. Stated thus it can readily be compared with what the same capital would earn if invested otherwise; as, for example, in government or railroad bonds, in mortgages, etc. If interest is deducted at all, as is done, for example, under some profit-sharing plans before allotting anything to the beneficiaries of the plan, it should be computed on the total capital invested in the business, including therein the surplus account; that is, surplus profits of previous years retained in the business and invested in plant or merchandise.

Axiom 16. Final profits properly signify the amount earned by the capital invested. If interest on capital is deducted this fact should be stated, and interest should be computed on the total capital employed.

Where a business is divided into several or many departments it is very desirable that the accounting system should show the profits or earnings of each of them separately, and this is usually feasible, except as to annual depreciations and as to interest charges. In some cases either or both of these items can accurately be distributed among the several departments, and if so, they should be so treated. Where they cannot be so distributed they should be deducted in a lump from the sum of departmental profits, and in this case it becomes convenient to adopt terms to designate clearly the profit account at its various stages. For this purpose the writer has found the following terms satisfactory:

Gross profits: the aggregate profits of all departments, prior to deducting depreciations and interest.

Net earnings: the gross profits after deducting depreciations.

Net profits: the net earnings after deducting interest on borrowed capital.

In comparing the results realized in two or more comparable concerns or businesses it is essential to contrast profits at the same stage in each case, and to employ terms which are mutually understood as to their precise meanings. No standard as to these terms has yet been established. The proper basis of comparison usually is that indicated above by the term net earnings, which eliminates the variations due to the employment or non-employment of borrowed capital.

Axiom 17. Terms used to designate profits should indicate clearly the stage of profits to which they refer, and should be mutually understood.

Inventory valuations are an important factor in determining profits. Usually an actual inventory is taken only once a year. The merchandise inventory includes

raw materials, stock in process, finished goods, and general supplies. A standard basis of valuation for each of these groups should be adopted and maintained from year to year. Raw materials, such as pig iron, raw sugar, baled cotton, ingot copper, etc., are often subject to wide fluctuations in market values or costs, and the question thus arises as to the proper inventory valuation of them, whether at cost, at market value at date of inventory, or on some arbitrary basis. If the effect of such fluctuations is negligible, that is, is small in ratio to the annual total of the account, either of the first two methods above stated may be used. If the fluctuations are large, however, either in range or in their effect on the annual total, that is, if they materially influence the profit and loss account of the year, some arbitrary plan of accounting for them should be adopted. In devising this, the two-fold purpose of the annual account, the operative and the statistical, should be kept in view. If the effect of the fluctuations is moderate in its ratio to the annual account a sound method consists in taking the mean, either of market prices or of actual purchase prices for say three or five years, as the basis for inventory valuations, and also for use in the compilation of costs, thus conforming to the average trend of market values but avoiding frequent and temporary changes. If, however, the effect of these fluctuations is serious or vital in determining the results of the business, a new factor is brought into the accounting problem, namely that of trading or speculating on the market. In the case of a sugar refinery or a cotton mill, for example, large profits or losses may result from market changes in the price of raw sugar or of baled cotton, or from the operations of the purchasing department. Obviously such gains and losses are totally unrelated to the economy and efficiency of the productive department, and to include them in its accounting might so distort it as to destroy its usefulness and its statistical value. In such cases a separate trading account should be established, through which to ascertain the profit or loss of the year in operating on the market for the raw material, the latter being charged to the manufacturing department at a constant price, conformed from time to time to average market conditions, this price being used also for inventory and cost purposes. In other words, the results of speculation on the market, however legitimate or necessary, should be segregated from the results of the normal operations of the plant.

Axiom 18. Speculative profits and losses should be segregated from those due to the normal operations of a business.

The inventory valuation of stock in process, that is, of stock in a partly manufactured condition, should be such as to cover the prime cost of the material, and of the productive labor already expended upon it, plus a ratable charge for manufacturing expenses. The inventory valuation of finished stock, that is, of stock completed ready for sale, should be on the basis of shop cost, not of actual cost, because the latter includes the cost of selling, and this has not yet been incurred. A paradox, apparent but not real, is created when the cost of a product is substantially reduced, because thereby the inventory value, and therefore the profit of the year, is reduced. If the inventory value at the beginning of the year were \$1,000, and if during the year the cost were reduced 10 per cent., obviously, if the quantity on hand at the close of the year were the same, the inventory value would be \$900, thus showing a shrinkage of \$100. In the following year, however, this apparent loss would be converted into an actual profit.

Axiom 19. A reduction in cost implies a corresponding reduction in inventory.

The annual inventory may properly include as assets certain items previously classified as expenses. One example of this kind is the premium on unexpired insurance. Another is the cost of a trade catalogue intended to serve say for five years. To charge the whole of important expenditures of this kind into the current expense account of the year in which they are incurred would tend to distort its statistical accuracy, and hence would be bad accounting. The proper treatment of such expenses is to determine the period they apply to, and to charge off a proportionate part in each month or year during that period, carrying the remainder in the inventory.

Axiom 20. Expenditures in one year which cover the requirements of several years should be distributed over the years to which they fairly apply.

The inventory valuation of all property other than merchandise should be on the basis of its fair value in the business as that of a going concern, which usually is the cost to replace, with due allowance for wear and tear. An annual inventory of all property, by actual enumeration and count, is indispensable to the proper conduct of any manufacturing business, and in some cases more frequent inventories of the merchandise stock are expedient. Without such annual inventories no determination of annual results is reliable or of much value.

Axiom 21. An annual inventory of all property is indispensable to accurate knowledge and to good management.

The question of depreciation of fixed property enters into all industrial accounting, and should be treated in connection with the inventory. In this, as in all discretionary matters of accounting, the aim should be to find and follow the median line, the mean between ultra-conservatism and radicalism. All fixed property, excepting land, depreciates and tends to become obsolete. Normal repairs and maintenance should of course be charged to current operating expenses, not added to cost or value, and these should fairly be considered in fixing the ratio of depreciation. Where a building or a machine is maintained in perfect condition obviously it depreciates more slowly than one which is neglected. A building may be so maintained as to depreciate little or not at all. The proper rate of depreciation for each class or kind of fixed property is a matter of good judgment, for which no rules can be laid down. It may be as low as 1 per cent. per annum, and in exceptional cases may be as high as 20 per cent. Usually it ranges from $2\frac{1}{2}$ to 10 per cent. When profits are abnormally large the allowance for depreciation may wisely be larger than when they are merely normal, but the normal allowance should be made even when no profit is realized. Under average conditions it usually ranges between 10 and 15 per cent. of the annual profits. A revaluation of all fixed property by outside experts or appraisers, at intervals of five or ten years, is expedient and usually worth its cost. Abnormal increases or decreases in the value of such property, as for example an increase in the value of land, or the loss due to the demolition of an obsolete building, should be covered into the surplus account, not into the profit and loss account of the year.

Axiom 22. Valuations of fixed property should be subject to annual review and to fair depreciation.

Finally, the aim and object of every accounting and cost system should be to afford true and accurate information as to facts. It is based on facts; it should embody and present facts, and naught else. To exaggerate facts and to show fictitious profits and values, is no worse than to depreciate facts and to conceal true profits and values.

Axiom 23. An accounting system should present facts, without bias in any direction.

Accounting, in its application to general business affairs, has long been a highly developed science, but is comparatively a new one in its specialized application to modern industry, with its vast and complex development. The creation of a *Correct Science of Industrial Accounting* and costs should be the desire and aim of all who are concerned with industrial management. To accomplish this, three things at least are needed:

1. Clear understanding of fundamental principles.
2. Definite terminology, generally understood and accepted.
3. Free interchange of the data of practice, whereby the adoption of sound principles may be promoted, the experience of each may be available to all, the best methods may become established, and, above all, a standard system may ultimately be created.

The accomplishment of these results, by affording complete and accurate knowledge of the essential facts pertaining to industrial efficiency, and to the costs of production, will tend greatly and permanently to promote the development of American industry, and to aid it in securing its full share of the markets of the world.

Book Reviews

Heaton's Annual. The Commercial Handbook of Canada. Edited by Ernest Heaton and J. Beverley Robinson. Cloth; size, $5\frac{1}{2} \times 7\frac{1}{2}$ in.; pages, 572. Publisher, Heaton's Agency, 32 Church street, Toronto, Canada. Price, \$1 per copy.

This publication is issued for its ninth year. It gives much official, financial, commercial, customs and general information with regard to Canadian matters. The customs information comprises the complete text of the existing Canadian tariff with an exhaustive index. Embodied in the volume is the Boards of Trade Register, giving a description of towns and business opportunities throughout Canada. The volume is a valuable source of information for those who desire to be posted on Canadian development.

The Metric System, Compared with American Weights and Measures. By Henry G. Bayer, author of educational works. Cloth; size, $4\frac{1}{2} \times 7$ in.; pages, 94. Published and for sale by the author, 232 Greenwich street, New York. Price, 85 cents.

The purpose of this book is to enable the reader to secure a thorough knowledge of the metric system and therefore a portion of the work is elementary in character. It gives the derivation of the system, an explanation of the units used, the signification of the terms and the usual general table of metric weights and measures with their equivalents in American weights and measures. A special feature of the book is a treatise on the adaptation of the metric system to other than the purposes as found in common use. A most valuable part of the book consists of comprehensive tables of equivalents of metric measures in United States measures and vice versa. These equivalents are given for lengths, surfaces, volumes, capacities and weights. Some attention is given to values of foreign coins in United States currency, miscellaneous measures and old measures still in use in certain countries, with their American equivalents. The book will thus be found a comprehensive study on the subject of weights and measures.

The Metric System in a Nutshell. By Henry G. Bayer. Paper covers; pages, 32. Published and for sale by the author, 232 Greenwich street, New York. Price, 35 cents.

This is a compendium of the metric system, giving 20 tables of equivalents of metric measurements in American weights and measures. It will be found a valuable book for the desk and for ready reference in making reductions from the metric to the American system and vice versa.

What to Read on Business.—Published by the Business Book Bureau, Mercantile Library Building, New York. Pages, 169; $5 \times 7\frac{1}{2}$ in. A descriptive catalogue of the books on business sold by the publisher. Lists many works on efficiency, management, methods, advertising, corporations, etc., and is indexed both as to titles and authors. Price 50c.

Gasoline Trouble Chart.—Arranged by Victor W. Page, M. E., author of the Modern Gasoline Automobile. Sheet, $22\frac{1}{2} \times 36$ in. Published by the Norman W. Henley Publishing Company, 132 Nassau street, New York. A paper chart which presents a sectional view of a gasoline engine, outlines the parts liable to give trouble and details the derangements. Folds to fit the pocket. Price 25c.

The Monarch Steel Castings Company, Detroit, Mich., is to extend its business considerably, as plans are now under consideration for enlarging its plant. Steel car couplers are the chief product, although a variety of steel castings are also turned out. At a recent meeting of the board of directors Philip H. McMillan was re-elected president; Joseph S. Stringham was elected manager; George M. Black, re-elected secretary and treasurer. These officers, with T. H. Simpson and James T. McMillan, constitute the board of directors. Mr. Stringham was engineer of the Solvay Process Company for many years.

The Virginia Iron & Coal & Coke Company is preparing to begin repairs on its blast furnace at Middlesboro, Ky., engineers having gone over the plant with a view to determining the work necessary to be done on it.

The British Metal Market in 1912

BY OUR BRITISH CORRESPONDENT

Ingot Copper

During the first half of the year copper had a remarkably strong market, prices advancing on the steady improvement in the statistical position both in Europe and America, which derived some additional importance from the strikes at the Eastern refineries of the United States. Consumption was very large, and the general industrial position was such as to encourage heavy speculation in the metal, Paris being largely interested, while powerful people with American connections led the way. Their view was fully borne out and the advance in price, it must be admitted, was entirely justified by trade conditions.

At this time the feeling is less optimistic, for the enormous increase in production in America in the past six months or so shows what is to be expected in the future. As soon as consumption shows signs of that falling off which is inevitable some day, there will be a sharp drop. The restricted confidence felt by consumers in Europe is shown by their hand-to-mouth buying. A sober opinion is that if America is going to give a monthly average output of somewhere round 65,000 tons, the world will not take it at anything like present prices. Standard metal in London moved between £60 17s. 6d. in January and £80 1s. 3d. in June for cash delivery.

Pig Tin

The tin market has been remarkably strong. The main feature of the year was the success which attended the efforts of the authorities of the London Metal Exchange to put a stop to the violent manipulation which had rendered tin a word of reproach to the metal-trading community. This effort consisted in widening the basis of dealings, which previously included only Straits and Australian tin, by the admission under fixed conditions of Dutch, English, Chinese and German tin as good delivery. This was bitterly resented by the moving speculative spirits in London. All sorts of protests were made, and much bad blood was created, but the net result was that the manipulating brokers acting for the European Syndicate refused to deal on the new contract, and since then the market has followed a more normal course than for years.

The principal commercial features have been the inadequacy of supplies and the constant inroads made on stock. The stock in London at the beginning of the year was 5363 tons; now it is only about 700 tons, while the visible supply, which a year ago was 18,895 tons, is at present no more than 13,794 tons. There seems no great hope of any material fall in the price until the supply and demand get much closer together, and this may not be until consumption falls off. The price ranged from £184 in January to £233 late in September.

Spelter

Spelter has had a good market, with price movements narrow. The convention regulating the European trade has every reason to be satisfied with the results of its policy. The upward swing in prices never exceeded £2 17s. 6d. a ton, being from £25 to £27 17s. 6d., a little more than 10 per cent., whereas in lead the range was about 55 per cent. The galvanized sheet trade has been most active, as is shown by the Board of Trade returns, the exports for 11 months of the year having been over 30,000 tons in excess of those for last year, standing at 598,000 tons. Big increases are shown to India and Japan, but American competition has been felt unpleasantly in Argentina and some other buying countries. The brass trade has been busy for most of the year, but is hardly at its best just now.

Pig Lead

Lead participated in the general boom in metals, while the convention proved all-powerful for the greater part of the year. Prices rose steadily until early in September, when £23 15s. was paid for prompt delivery. This proved the crest of the movement, and when the demands of a speculative nature, largely responsible for the rise to this level, were satisfied prices fell back very sharply, and down to £18 was paid early in December. The position is sound enough and the speculative account for the rise is insignificant in extent.

The feature ever since the drop has been the reserved

attitude of consumers, but comfort is derived by holders of lead from the fact that users are all bare of stock and a sharp movement is anticipated when urgent demands of any volume have to be filled. In the first 11 months of the year the imports of lead in pigs and sheets totaled 190,000 tons, a reduction of about 10,000 tons compared with last year, while the exports were 43,800 tons, or 2600 tons gain.

Customs Decisions

Drilling Machines

The Board of United States General Appraisers has sustained a protest filed by R. F. Lang regarding the classification under the tariff act of electromagnetic drilling machines. The articles are used in shipbuilding yards, bridgebuilding shops and boiler works. They were returned for duty at 45 per cent. ad valorem under paragraph 199, as manufactures of metal. The board finds that the machines are metal-working, power-driven mechanisms for use in boring or drilling, and fall properly dutiable, as claimed, at 30 per cent. ad valorem under the provision in the law for "machine tools."

Metal Sawing Machines

The board sustained a claim by J. G. Braum relating to so-called sawing machines, which had been returned for duty at 45 per cent. as "manufactures of metal" under the present law. It was shown to the satisfaction of the board that the articles are power-driven, used for sawing metal, and consequently "machine tools" dutiable at 30 per cent. ad valorem under the act. Dressing machines, known in the trade as metal-working straightening machines, imported by the same importer, were held not to be machine tools as claimed, but dutiable at 45 per cent. under the metal schedule.

Brazing Compound

The F. H. Phillips & Sons Company succeeded in securing lower duty on metal material used for brazing. It was returned for duty at 45 per cent. ad valorem under the present tariff, as "manufacturers of metal not specially provided for." The importer claimed the merchandise to be dutiable at 20 per cent. ad valorem under the provision for non-enumerated manufactured articles. The collector at Philadelphia was reversed.

Progress of Knox Water Cooled Ports and Doors

Irvin F. Lehman, treasurer and general manager of the Knox Pressed & Welded Steel Company, Pittsburgh, Pa., will leave the early part of February for a trip to England and the Continent of Europe, to interest foreign steel makers in the Knox patented water-cooled ports, doors and door frames. This company now has its devices in operation in 46 open-hearth plants in the United States, has received duplicate orders from 31, and has completely equipped throughout 8 plants. Knox patented welded steel doors and frames are replacing cast shapes in many of the most important works in this country.

No. 3 McKeesport furnace of the National Tube Company was blown out for relining January 11, conditions developing which required this action, though the furnace had been considered good for a further run of several months. It is probable that Edith or Neville Island furnaces, both of which have long been inactive, will be put in blast.

The Otis Elevator Company announces that the designing and manufacturing of worm gearing of the Hindley type, which has been a branch of its business for many years, will hereafter be carried on by the Hindley Gear Company, a corporation organized under the laws of Pennsylvania, with offices at 1105 Frankford avenue, Philadelphia.

The American Rolling Mill Company, Middletown, Ohio, will soon have in operation a new mill for rolling sheets heavier than No. 18 gauge.

Judicial Decisions of Interest to Manufacturers

ABSTRACTED BY A. L. H. STREET

RIGHTS ON EXPIRATION OF PATENT.—The right of anyone to manufacture and advertise a device on expiration of a patent therefore cannot be limited by the patentee registering as a trademark a drawing describing the use of the device. (United States Circuit Court of Appeals, Eighth Circuit, Bristol Company vs. Graham, 199 Federal Reporter 412.)

INJURY TO CHILD CAUSED BY CARBIDE.—One who leaves unguarded carbide on his premises near a public street, knowing that children customarily explode it by pouring water on it, is liable for injury to one of the children who attempted to light gas so generated. (Minnesota Supreme Court, Juntii vs. Oliver Iron Mining Company, 138 Northwestern Reporter 673.)

RESPONSIBILITY FOR SLANDER BY AUDITOR.—Statements made by the auditor of a company that there had been forgery and a clerk must settle do not render the company liable as for slander, the auditor's authority being limited to an investigation of accounts. (Arkansas Supreme Court, National Packing Company vs. Boullion, 151 Southwestern Reporter 244.)

INJURY TO FOUNDRY EMPLOYEE BY COGWHEELS.—The Indiana statute which requires dangerous cogwheels in manufacturing establishments to be guarded to prevent injury to workmen extends to the cogwheels on a punching machine in a foundry. A laborer injured while cleaning such a machine while it was in motion under order from a superior, the injury being caused by lack of proper guard, cannot be said to have been necessarily negligent in undertaking the work. (Indiana Supreme Court, American Car & Foundry Company vs. Adams, 99 Northeastern Reporter 993.)

INSPECTION OF CRANE APPLIANCES.—AMOUNT RECOVERABLE FOR PERSONAL INJURY.—The duty of a manufacturer to inspect tongs attached to a crane used in moving steel billets could not be delegated to employees as a detail of their work so as to defeat liability of the manufacturer for injury to a laborer caused by a load falling from the tongs on account of a defect in them. The amount of \$6000 was not excessive recovery for such injury which consisted of a fracture of the bones of a leg so as to make it two inches shorter than the other leg and as to probably compel the injured workman to use crutches permanently. (Wisconsin Supreme Court, Bertulis vs. Illinois Steel Company, 138 Northwestern Reporter 613.)

DUTY TO WARN WORKMEN OF DANGER.—An employer is not liable for injury to an employee resulting from failure to warn an experienced workman against danger in doing work which the employer had no reason to suppose he would undertake; for instance, where a workman's hand is drawn into the gearing of a machine while he is cleaning it at the request of a fellow workman. (Massachusetts Supreme Judicial Court, Ojala vs. American Steel & Wire Company, 99 Northeastern Reporter 960.)

SELLER'S AGENCY FOR BUYER IN SHIPPING GOODS.—A seller of goods, acting as the buyer's agent in shipping them, has no implied authority to agree that the carrier's liability shall be limited to an amount less than the value of the goods, in consideration of a reduced freight or express rate. (Illinois Supreme Court, Nonotuck Silk Company vs. Adams Express Company, 99 Northeastern Reporter 893.)

VOID AGREEMENTS ENGAGING DETECTIVES.—A contract engaging a private detective to procure evidence against employees on charges of larceny or embezzlement is rendered void if it makes the detective's right to compensation dependent solely on his procuring evidence of guilt of employees, since there is a tendency to induce him to manufacture evidence. (Wisconsin Supreme Court, Manufacturers' & Merchants' Inspection Bureau vs. Everwear Hosiery Company, 138 Northwestern Reporter 624.)

RIGHT TO RESCIND PURCHASE OF MACHINERY.—Under the law in Texas, when there is no fraud in a sale of machinery and no agreement to return, the buyer cannot, at his own option, rescind the contract for breach of an express or implied warranty as to the condition of the machinery, but has only an action on the warranty for damages, the measure of which is the difference between the value of the machinery as it is and as it was represented to be. If, however, there is an express or implied agreement that the buyer shall not be required to keep the article if not such as was stipulated for, the contract may be rescinded and the machinery returned. (Texas Court of Civil Appeals, Texas Machinery & Supply Company vs. Ayres Ice Cream Company, 150 Southwestern Reporter 750.)

TRANSFER OF TITLE UNDER SALE OF PIG IRON.—The quantity of 5200 tons of pig iron constituted part of a

larger amount owned by a furnace company and pledged to its selling agent and stored on a lot of ground owned by the company, but leased to the selling agent, and under the contract the selling company sold the pig iron in question, received the price, and issued certificates of ownership, but before any separation from the bulk had been made the furnace company passed into the hands of a receiver, after which some one interested in the sale, without the receiver's authority, separated the 5200 tons and marked the lot with the purchaser's initials. Held that title vested in the purchaser as against the furnace company. (Pennsylvania Supreme Court, Westinghouse Air Brake Company vs. Harris, 85 Atlantic Reporter 78.)

Horton and Morrow Chucks

The E. Horton & Son Company, manufacturer of chucks, Windsor Locks, Conn., has acquired the exclusive right to manufacture the chucks heretofore made by the Morrow Mfg. Company, Elmira, N. Y. It appears that the change has been forced solely through the demand on the Morrow Mfg. Company to produce automobile parts, into which manufacture it embarked some time ago. The Morrow chuck, which is for use with drills, is a favorite creation of Alexander P. Morrow, of the Morrow Mfg. Company, and the fact that he had to relinquish the further manufacture of the device is a commentary on the activity in the automobile industry, the making of transmissions and other automobile parts having now reached proportions which threaten to require the exclusive attention of the Morrow Company. Naturally, the E. Horton & Son Company is strengthened by its acquisition, the Morrow chuck being one employing ball bearings and intended for hand operation, requiring no key, spanner or wrench.

The constitutionality of the Massachusetts law providing that a manufacturer advertising for help in a strike must state that there is a strike is being tested. A judge in the municipal court of Lynn, before whom this question was brought, decided in a *pro forma* way that the law is constitutional in order that the ground might be laid for a real test case. The matter will be taken to the Supreme Court of the State and probably to the United States Supreme Court.

Representatives of blast furnaces in eastern Pennsylvania had a conference in New York, January 21, with representatives of iron mines in northern New Jersey and southeastern New York. The matter under consideration was the adjustment of rates on iron ore, in view of the recent decision of the Interstate Commerce Commission, in the cases brought by B. Nicoll & Co., New York, and the Wharton Steel Company, Wharton, N. J.

Barber & Ross, Washington, D. C., report contracts taken by them for structural steel work the past month as follows: Department of Commerce and Labor Building, 800 tons; National Training School for Boys, 75 tons; National Capital Press Building, 160 tons; Y. M. C. A. Building, Wilmington, N. C., 65 tons; Winecoff Hotel, Atlanta, Ga., 600 tons.

The Union Twist Drill Company, Athol, Mass., has acquired the S. W. Card Mfg. Company, Mansfield, Mass., and Butterfield & Co., who operate factories at Derby Line, Vt., and Rock Island, Quebec. Both of the concerns taken over make taps, dies and screwplates.

The blast furnace of the Delaware River Steel Company, Chester, Pa., will be blown out this week for relining and other minor repairs. A 20 x 80 ft. McClure hot blast stove is to be added. The stack will be idle about a month.

Bear Spring furnace of the Dover Iron Company, Bear Spring, Tenn., which has been out of blast for repairs, will probably blow in again by February 15. The product is charcoal iron and the output from 10 to 12 tons a day.

The American Anti-Boycott Association, Herman Fred-eric Lee, secretary, 27 William street, New York, will give its annual dinner Friday evening, February 7, at the Waldorf-Astoria, New York.

The Thomas Iron Company, Easton, Pa., and the Empire Steel & Iron Company, Catasauqua, Pa., operating furnaces in the Lehigh Valley district, have advanced the wages of their employees 10 per cent.

The Machinery Markets

Inquiries and purchasing of fair volume when taken collectively, but none of which is large enough individually to arouse comment, are prevalent in nearly all of the machinery buying centers. New York has a scattered and miscellaneous demand and is awaiting with confidence the placing of orders which are slow to close. Philadelphia conditions are irregular, although some fair business is reported. In New England general trade has diminished a little, but manufacturing in metal lines is brisk. There has been an improved demand for single tools in Cleveland, where some projected factory building is awaited with interest. With an improvement in the export demand, conditions are fairly satisfactory in Cincinnati, although some plants have been crippled by flood waters. The single tool and small lot activity has been particularly good in Detroit, with an excellent demand for woodworking machinery. Inquiries are more numerous in Chicago, with sales maintaining about the same level. The Central South has suffered from high water in the Ohio River and its tributaries, many plants having been damaged. St. Louis conditions are unchanged, with single tool orders in good number continuing to appear. Trade in Birmingham is satisfactory and the prospects are good. The demand for pumping machinery continues to increase in Texas. On the Pacific coast the general machinery market shows increasing activity, there having been some railroad buying, while mining equipment is moving well and the aggregate of small inquiries is unusually large.

New York

NEW YORK, January 22, 1913.

The New York market has been quiet. Business has been of a miscellaneous and scattered character with the larger prospects showing a disposition to proceed slowly in closing. Minor inquiries are fairly numerous. The trade has plenty of confidence, however, which is based on orders pending for a large amount of requirements made known since December 15. It is asserted that January may be a rather poor month, but this feeling has prevailed before many times and been very quickly changed. The New York automobile show, at which trucks and commercial vehicles are the feature this week, continues to absorb a great deal of attention from salesmen and managers, many of whom have come from distant points to meet their customers. The Edison Storage Battery Company, West Orange, N. J., whose plans for enlargement of plant have been mentioned heretofore, recently placed an order for 14 automatic turret lathes with one manufacturer.

The Holt Mfg. Company, 50 Church street, New York, has plans well under way for the construction of its new plant at Harrison, N. J., where the smaller sizes of the Holt caterpillar tractor will be built. The plant is to be of reinforced concrete construction and will cost about \$50,000. Bids will be taken early in February on the general contract. Oswald Hering, 132 Madison avenue, New York, is the architect.

The Newark Wrapping Machine Company, Elizabeth, N. J., has had plans prepared for a new building which it will erect on property recently acquired on South Spring street, Elizabeth. The company states that most of its machinery requirements have been contracted for.

Plans for a water works system for the village of West Winfield, N. Y., have been completed and submitted to the State Conservation Commission and approved. W. G. Stone, Mann Building, Utica, is consulting engineer. The estimated cost of construction is \$33,000.

The Rensselaer Polytechnic Institute, Troy, N. Y., will remodel, repair and re-equip its three-story laboratory building. Plans have been completed by Architects Lawlor & Haase, 69 Wall street, New York City. Bids for the work are being received.

The factory of the Ideal Furniture Company, Jamestown, N. Y., was partially destroyed by fire January 15. Steps for rebuilding will be taken at once.

The Board of Lighting Commissioners, Jamestown, N. Y., has taken action looking to the purchase of additional equipment for the municipal electric light plant. The new equipment contemplated includes a turbo-generator and two or more boilers.

The Binghamton Paper Box Company, Inc., Binghamton, N. Y., has filed incorporation papers with a capital stock of \$20,000 and will soon arrange for the equipment of a manufacturing plant. The directors are B. F. McKeage, Jr., and G. S. Keeper, Binghamton, and B. F. McKeage, Montrose, Pa.

Plans have been completed by the Erdle Perforating Company, 279 Mill street, Rochester, for a new factory building 75 x 300 ft., brick, which it will erect on York street.

The Clark Paper Mfg. Company, 83-88 Mill street, Rochester, N. Y., has let contracts for construction of

its new manufacturing building, which will be 63 x 113 ft., three stories and basement, with a one-story power house 40 x 60 ft.

The Northern Sanitary Company, Buffalo, has been incorporated with a capital stock of \$200,000 and will engage in the construction of sewage disposal plants, sewers, drains and other municipal contracting work. Charles I. Shepard, Merritt D. Metz and John H. Cooper are among the incorporators.

The item relating to the North Tonawanda plant of the Flaxen Fibre Down Company, of Lockport, N. Y., appearing in last week's issue of *The Iron Age* gave the name of the president erroneously. It should have read "J. Sidney Starling, president."

The West End Brewing Company, Utica, N. Y., will build and equip an addition, 90 x 130 ft., to its brewing plant, plans for which are in preparation.

New England

BOSTON, MASS., January 21, 1913.

The General Electric Company is buying some machinery for the Lynn works, and it is understood that other requirements for the company's plants are projected. The United Shoe Machinery Company is buying more liberally than for months. Business has not changed a great deal, but occasionally one meets a manufacturer who finds a falling off in orders. These cases are confined almost entirely to producers of what may be termed basic equipment, that is to say machinery and the like. Generally speaking, they are exceptions, and probably the total of this trade has diminished very little. Manufacturing as a whole in metal lines is brisk.

The American Graetz Light Company, a branch of the Elhrich & Graetz Company, Berlin, Germany, is reported to be negotiating for a factory at Bridgeport, Conn., where it proposes to manufacture its lamps for the American trade.

The United Optical Company, Webster, Mass., plans to erect an addition to its die sinking department.

The business of the Dwight Slate Machine Company, Hartford, Conn., together with the complete equipment, was sold at auction January 16. There was a large attendance of buyers and the newer machinery brought very good prices. C. E. Bilton purchased for the Standard Mfg. Company, Bridgeport, Conn., the company's line of automatic gear cutting machines, together with the Elmore high speed ball bearing sensitive drilling machine. Noble & Westbrook, Hartford, Conn., bought the marking machine, while the automatic feed drilling machine went to Theodore Friedenberg, New York City. These sales include the name, the right to manufacture the machines, the patterns and drawings, the fixtures and finished parts. The Elmore drilling machine went with the understanding that a royalty for the inventor must be paid by the purchaser. Three Jones & Lamson 2 x 24 in. flat turret lathes, new July, 1910, brought \$575 each, and a 1906 machine of the same type \$437. A Lucas 1910 model boring machine, with special platen 20 x 48 in., sold for \$1,175, as compared with \$1,530, the original price. A Fosdick 2-ft. radial drilling machine brought \$295; a Cincinnati No. 3 plain milling machine \$675; No. 15 Garvin plain milling machine \$400; Brown & Sharpe No. 11 plain grinding machine \$265; Brown & Sharpe No. 3 universal grinding machine \$600; Lodge & Ship-

ley 10 x 10 ft. engine lathe \$380; Norton universal tool and cutter grinding machine \$210. These are indications of the run of prices brought under the hammer.

The New Departure Mfg. Company, Bristol, Conn., has purchased the fine plant of the Whitlock Coil Pipe Company, Hartford, Conn., and will operate it as the New Departure Mfg. Company, Hartford Division, under the management of A. S. Hyde, with Hartford as the post office address. Beyond the fact that the factory equipment end of the New Departure business will be carried on at Hartford, manufacturing plans for the newly acquired works are not completed. The company will occupy the premises as soon as possible. One unit of the plant, known as the pipe building, has been leased back to the Whitlock Company, which will carry on its business on the premises. The works are located at Elmwood, a suburb, and are modern in every respect.

The Connecticut Turbine Mfg. Company, New London, Conn., which is a new corporation, occupying a plant recently completed, has issued an advance sheet setting forth the details of its product. Its new steam turbine will be built in sizes from 25 to 500 hp., and a specialty will be made supplying complete units of pumps, blowers, fans and generators. The turbine has an improved system of steam distribution and bucketing, with flowed bronze wheel buckets formed in the wheel rim, and flowed bronze return buckets in detachable sections.

The Crane Valve Company, Bridgeport, Conn., has let the contract for a manufacturing building, 97 x 332 ft., two stories, of brick and steel construction.

The Siemon Hard Rubber Company, Bridgeport, Conn., has purchased a tract of land which will be used to contain an extension of the present factory.

The New Departure Mfg. Company, New Britain, Conn., will add two stories to a factory and office building 62 x 215 ft.

The American Hardware Corporation, New Britain, Conn., is planning to add three stories to a factory building 60 x 216 ft., which is a part of the P. & F. Corbin works.

The Farmington River Power Company, the plant of which is at Tariffville, Conn., has asked the Connecticut legislature for the right to issue \$500,000 of new stock, with the intention of further developing its power. The Hartford Electric Light Company, Hartford, Conn., is issuing \$600,000 of new stock, the proceeds of which will be devoted to increasing the company's plant.

Other additions to capital stock in Connecticut are those of the Hopkins & Allen Arms Company, Norwich, from 5000 shares common to 5000 shares common and 1000 shares preferred; United Foundry & Machine Company, from \$200,000 to \$250,000, and the Union Mfg. Company, New Britain, Conn., 8000 shares, making the outstanding capital \$500,000.

Philadelphia

PHILADELPHIA, PA., January 21, 1913.

Reports of manufacturers and merchants relating to business conditions since the opening of the year show considerable variance. Some report that a fair volume of new orders has been taken; others that business continues to drag. Beyond the recent inquiry for tools by the Lehigh Valley Railroad the demand from railroads has been at a standstill. The Pennsylvania has made scattering inquiries for several months, but orders have been extremely light. The local locomotive builder continues to enter a very fair volume of new business. The machine tool demand is irregular and comprises mostly single and small tools covering a considerable range as to character. The second-hand machinery market is quiet. A moderate demand for power equipment is noted, particularly in the smaller units. The casting trade continues good, with steel casting plants the most active. Very little movement in machinery or tools for export is reported.

White & Bros., Inc., smelters and refiners, will erect a one-story addition, 33 x 34 ft., to their plant at Hedley and Carbon streets. The new addition will be used for smelting furnaces. A new office building has recently been erected by this concern. It is now considering the installation of additional power equipment.

The Heywood Brothers & Wakefield Company is building a manufacturing plant at Sharp and West streets, in Baltimore, Md., which will be used for the finishing of chairs. A power plant and woodworking machinery are to be installed. Details as to the equipment required have not yet been prepared.

The Hyde Brothers Steel & Rail Company has been incorporated under the laws of Delaware with a capi-

tal stock of \$200,000, and will engage in buying and selling iron, steel and their various products. The incorporators are H. Ralph Ewart, C. J. Jacobs and Harry W. Davis, all of Wilmington, Del.

The Staybestos Mfg. Company, Germantown, Philadelphia, manufacturer of the S. M. C. frictional facings, asbestos brake and clutch linings, etc., has been incorporated with a capital stock of \$10,000. The company proposes to materially increase its plant and facilities, and will purchase rolling and punching machinery of the character necessary.

The Pennsylvania Shafting Company, Spring City, Pa., will manufacture exclusively, under patents of William H. Wright, taper roller bearings for automobile and truck service. The material for both the rollers and the castings is of 3½ per cent. nickel steel. Plans have been drawn for an extensive addition to its present plant, but the work has not yet been authorized. The company recently purchased some Landis grinding equipment and will shortly arrange to purchase automatic screw machinery for use in the manufacture of the bearings.

It is stated that Deitrich Brothers, fabricators of structural iron and steel, Baltimore, Md., have under consideration the erection of three large shops in an outlying district of Baltimore. Report has it that three buildings 70 x 300 ft. will be erected and fully equipped with the necessary machinery. Details, however, are not available.

The William Steel & Sons Company will begin work at a very early date on a five-story factory building 60 x 277 ft., and a one-story boiler house 34 x 66 ft., at Thirty-third and Arch streets, for the Electric Dental Mfg. Company. The buildings will be fireproof and contain modern equipment.

It is stated in the daily papers that Henderson-Kidd Company, now operating a machine shop at Fifth avenue and Ward street, Chester, Pa., has decided to erect a new shop at Fifth avenue and Morton street, in that city.

The Pennsylvania Equipment Company, West End Trust Building, Philadelphia, Pa., is in the market for a small second-hand cupola about 4 ft. 6 in. in diameter x 16 ft. to charging floor.

Ballinger & Perrot, engineers, are taking estimates on a boiler house, 17 x 32 ft., and a dye house, 46 x 54 ft., for the Camden Dyeing & Finishing Works, Camden, N. J. The purchase of necessary equipment for these additional buildings will be taken care of by the company itself.

Chicago

CHICAGO, ILL., January 21, 1913.

Some improvement is noted in the inquiry for machine tools, the business actually closed being of a miscellaneous character. The general trade has not regained its stride since the first of the year, but the large volume of unfilled orders carried over into the new year makes the whole situation decidedly strong. This confidence is reflected in a proposed horizontal advance in prices of machine tools, an advance which is expected to be of a much more substantial character than the recent adjustments of 5 and 10 per cent. Of the recent Wabash Railroad list it is understood that only the cranes, punches and shears have thus far been considered, and awards on the remainder of the list will probably not be closed for another fortnight.

The Chicago Patented Tools Company, Chicago, has now been incorporated with a capital stock of \$20,000.

The Phenix Specialties Company, Chicago, has been incorporated with a capital stock of \$1,500 to do a general machine shop, foundry and woodworking business. The incorporators are R. H. O'Connor, Ed. O. Kesler and I. F. Reedy.

The Traction Lubricating Company has contracted for the erection of a factory at Chicago Heights, and will begin building at once.

Weil Bros., 653 West Lake street, Chicago, are having plans prepared for a six-story warehouse 30 x 155 ft., to be erected at a cost of \$36,000.

The Swedish-American Tool Company, Chicago, has been incorporated with a capital stock of \$2,500, by H. H. Bernstein, B. H. Bean and Charles A. Tice. The company may be addressed in care of C. A. Tice, 9344 Palmer avenue.

Joseph Kral is having plans prepared for a shop 50 x 200 ft., two stories, to be used for the building of motor trucks. It will be located at Twenty-second street and Center avenue, and will cost \$30,000.

The Kaiserman Shade Roller Company, Kankakee, Ill., has increased its capital stock from \$30,000 to \$100,000 for the purpose of increasing its mechanical equipment and output.

The Chicago & Northwestern Railway has purchased 260 acres between Kenosha and Racine on which it will build yards, roundhouses and shops.

The Fort Dodge, Des Moines & Southern Railway is about to enlarge its power plant with an expenditure of \$100,000. An additional 5000-hp. turbine will be installed.

The Emerson-Brantingham Company will erect an addition 40 x 50 ft. at the Newton Wagon Works' plant, Batavia, Ill.

The Schuessler Foundry Machine Company, Belleville, Ill., has been incorporated with a capital stock of \$2,500, to engage in a general foundry business. The incorporators are Adolph J. Schuessler, Helen Schuessler, Oscar P. Schuessler.

Fred Kuethe and Gusav Keil are establishing a general machine shop at Marshfield, Wis., the business to be conducted as a partnership.

The Madison Gasoline Engine Company, Madison, Wis., has made application for a charter with an authorized capital stock of \$15,000. The incorporators are W. C. Bently, J. W. Proctor, A. O. Ledford and H. L. Westover.

Koehler & Hanson, Odebolt, Iowa, are erecting a garage for which new machinery suitable for automobile repairs will be required.

L. J. Midgorden and W. E. Hougas, Lamoni, Iowa, are buying a lathe and other machinery to be installed in a garage of which they are the proprietors.

The Farm Tractor Company, Indianapolis, Ind., through its president, T. B. Funk, is negotiating for the location of its plant at New Castle, Ind., where it agrees to operate with an annual output of 5000 tractors.

The Foster Machine Company, Elkhart, Ind., has filed notice of an increase in its capital stock from \$25,000 to \$150,000.

Cleveland

CLEVELAND, OHIO, January 21, 1913.

There is an improved demand for single tools, in which dealers did a good volume of business in the week. Inquiries for small lots of tools are better. While definite lists have not been sent out, several Ohio manufacturers are in the market for machine tool equipment, but have not yet definitely decided what they will purchase. Several additional factory building projects have developed and these new plants and extensions will require considerable equipment within the next few months. The demand from railroads for single heavy tools has improved. Considerable second-hand machinery is being thrown on the market, for which there is a fair demand.

Jobbing foundries are well filled with work and are running at full capacity, but castings are not so hard to get for early delivery as a few weeks ago. The easing up of the pressure on foundries for deliveries is attributed to an increased production made possible by better supply of labor, brought about by the return to the foundries of molders who were engaged in outside work during the open weather.

A large plant for the manufacture of gasoline traction engines will be established in Cleveland or vicinity by the Wallace Tractor Company, which is owned by the same interests as the J. I. Case Plow Company, Racine, Wis. The officers of the two companies are identical. The new company has commenced the manufacture of its products in the plant formerly occupied by the Royal Motor Car Company on East Seventy-second street, Cleveland, and may eventually secure this plant as its permanent site if the adjustment of financial affairs of the Royal Company make possible the transfer of the property. The company expects to purchase considerable equipment, but will probably not be in the market for this for about six months. The local manager of the Wallace Tractor Company is F. G. Street, 1308 Williamson Building, Cleveland.

The Park Drop Forge Company, Cleveland, will shortly begin the erection of an extension to its plant which will provide 10,000 sq. ft. additional space. This extension will be used for a machine shop and will enable the company to provide additional space for its forge shop in the part of the plant now occupied by a machine shop. Enlargement of the plant has been made necessary by a large volume of orders recently received for automobile crankshafts. This company is now shipping 200 crankshafts a day in addition to its other automobile forgings and has recently received large crankshaft orders from the Locomobile Company, Packard Motor Car Company, the White Company, and the H. H. Franklin Mfg. Company, in addition to other orders. The company will be in the market in the spring for additional equipment for its ma-

chine shop and for some new hammers for its forge shops.

A complete line of punching, toggle and blanking presses, shears, and other sheet metal machinery will be placed on the market by the Cleveland Machine & Mfg. Company, Cleveland, in addition to its other products. W. H. Welch, recently superintendent of the Toledo Machine & Tool Company, has become associated with this company as sales manager of the press department and designer of its sheet metal working machinery.

The Cleveland Galvanizing Works Company, maker of chain, pattern letters and other products, will shortly begin the erection of a five-story factory addition 40 x 140 ft. The building will be of concrete construction. The company will install a new power plant and will be in the market for the necessary equipment. Very little new equipment will be required in machine tool lines. This company recently added to its chain products two new types of weldless wire chain adaptable to a wide variety of manufacturing purposes.

The Sidney Tool Company, Sidney, Ohio, has increased its capital stock from \$100,000 to \$150,000.

The Berger Mfg. Company, Canton, Ohio, is in the market for a number of machine tools, including 14 to 20-in. lathes, 16 to 20-in. shapers, milling machines and one boring mill.

A lease on the foundry portion of the plant of the Brown Clutch Company, Norwalk, Ohio, has been taken up by several Norwalk men who have planned the establishment of a foundry for making gray iron castings. The company will be incorporated under the name of the Sandusky Machine Castings Company.

The Cleveland Bed Spring Mfg. Company, Cleveland, is a new concern that has been incorporated with a capital stock of \$10,000 by Herman Printz and others.

The Iceless Refrigeration Company, Cleveland, which has been doing experimental work in the plant of the Royal Motor Car Company, has acquired the plant of the Grant Automobile Company, and is moving into its new quarters. The company has purchased some additional machinery for the plant and will shortly place on the market refrigeration equipment.

The Standard Pump & Engine Company, Cleveland, Ohio, maker of pumps for residence water supply systems, has opened a storeroom at 1406 West Third street in that city and has moved its offices from the factory to the new location. The company will have on exhibition at its storerooms both its electric and gas pumps in operation.

A new plant for the manufacture of aluminum ware has been established in Cleveland, Ohio, by the Monarch Aluminum Ware Company, which is located on East Forty-ninth street. The company will make a complete line of aluminum cooking utensils. Raymond Deutsch is the manager.

It is reported from Toledo, Ohio, that a \$500,000 electric power plant operated by steam will be built near that city by the interests represented by H. L. Crawford & Co. and the Crawford, Patton & Cannon Company, of New York, which interests have recently assumed the entire control of the Maumee Valley Electric Company, the Suburban Light & Power Company and the Defiance Gas & Electric Company, three power and light companies in Northern Ohio.

The Standard Tent & Awning Company, Toledo, Ohio, has been incorporated with a capital stock of \$10,000. The company is establishing a plant at 1309 Washington street, in which machinery is being installed for the manufacture of tents, awnings and allied lines. Walter A. Schuchart is secretary and treasurer.

The Telephone Improvement Company, Galion, Ohio, maker of telephone equipment, has about completed a new manufacturing plant in that city which is expected to be in full operation within 30 days. The equipment of the North Electric Company, formerly located in Cleveland, has been moved to the new plant.

Bids will be received at the office of the Director of Public Service, Cleveland, February 3, for switchboard apparatus and remote control electrically operated oil switches for the new municipal electric lighting plant.

The Virden Mfg. Company, Cleveland, maker of lighting fixtures and various brass specialties, has increased its capital stock from \$10,000 to \$25,000.

The Coronet Mfg. Company, Cleveland, has been incorporated with a capital stock of \$60,000 to manufacture a speedometer for automobiles. Harry W. Garberson and others are interested.

The Defiance Welding Company, Defiance, Ohio, has been incorporated with a capital stock of \$10,000 to manufacture and deal in iron and steel and other metal products. The incorporators are F. A. and H. D. Bokop, E. W. Costello and others.

The M. Tire & Rubber Company, Akron, Ohio, is a new concern that has been incorporated with a capital stock of \$20,000 by Alloys Michler, E. B. Kintz, Charles G. Smith and others.

Detroit

DETROIT, MICH., January 21, 1913.

A first-rate normal demand for machine tools has existed in the Detroit market the past week, although the business has been confined to single tool and small lot transactions. Inventory taking is still absorbing the attention of many large industries, and when this has been completed it is believed there will be a still more active demand. Second-hand machinery is moving more freely. Especially noteworthy is the demand for woodworking equipment, some good inquiries having been received from upstate manufacturing interests. There is a fair movement in electrical equipment, small motors being in especial demand. Makers of sheet metal stampings report an excellent volume of orders. Foundry plants doing a jobbing business continue to find business satisfactory. Considerable new work is being figured on in building lines.

The Stock Process Steel Company, Detroit, whose incorporation was recently announced, has acquired a tract of four and one-half acres on the Detroit Terminal Railroad, improved with a brick and steel foundry building 65 x 150 ft., and will install equipment for the manufacture of steel castings. Another building is also contemplated. Allen Mosher, formerly vice-president of the Dominion Steel Company, is at the head of the new company.

It is announced that the Detroit Shipbuilding Company, Detroit, will, in rebuilding its hull building plant at Wyandotte, Mich., which was partially destroyed by fire last August, make considerable improvements, materially increasing its capacity.

The Modern Laundry Company, Detroit, has awarded the contract for the construction of a new laundry plant to cost \$12,000.

The Michigan Folding Box Company, Detroit, has been incorporated with a capital stock of \$100,000, to manufacture boxes and other specialties. George W. Hartley, Hiram W. Brown and Alexander F. Laffrey are the incorporators.

The Timken Roller Bearing Company, Detroit, is constructing a new factory 64 x 240 ft., to be used for the grinding of cups, cones and rollers. It is estimated to cost \$100,000.

The United Forge & Machine Company, Detroit, has been incorporated with \$10,000 capital stock by Alexander Ogilvie, James E. Chambers and R. J. Moynihan.

George W. Graves, architect, Detroit, is preparing plans for a new factory which will be built at Walkerville, across the river from this city, by Tate Electric, Ltd. The building will be 60 x 260 ft., two stories, and will be equipped for the manufacture of electric automobiles.

The Klise Mfg. Company, Grand Rapids, Mich., has been incorporated with \$25,000 capital stock, to take over the Grand Rapids Molding Company and the Grand Rapids Woodcarving Company. Among those interested are A. B. Klise, Charles S. Davis and John A. Klise. The company will build a new factory, it is stated.

The capital stock of the Antrim Lime Company, Grand Rapids, Mich., has been increased from \$28,000 to \$50,000.

The Federal Motor Truck Company, Detroit, has increased its capital stock from \$100,000 to \$200,000.

Fred H. Perry has purchased the property of the Cyclone Fence Company, at Holly, Mich., and will engage in the manufacture of steel stalls and other stable equipment.

The Superior Foundries Company, Trenton, Mich., which was recently organized, is completing plans for the building of a large foundry plant.

The brass and aluminum foundry of the Buick Motor Company, Flint, Mich., was destroyed by fire January 17, at a loss officially estimated at \$50,000. The foundry will be rebuilt at once.

The Michigan Central Railroad has completed plans for the building of a 250-ft. extension to its shops at Jackson, Mich. The tank shop will also be enlarged and a new blacksmith shop erected.

The Detroit Tractor Company, Detroit, has filed articles of incorporation, giving its capital stock as \$50,000, for the stated purpose of manufacturing gasoline tractors. George J. and Frank E. Baker are the principal stockholders.

Cincinnati

CINCINNATI, OHIO, January 21, 1913.

Conditions with machine tool people are fairly satisfactory, due to some extent to an improvement in the export business with quite a number of local manufacturers. The large number of railroad lists out also holds out encouragement, but buying against these has been slow.

The high water has temporarily crippled a number of manufacturing concerns, but several of them were able to continue operating by the construction of brick dikes around their plants, notably among the larger ones employing this method successfully is the John H. McGowan Pump Company. By employing barges the Cincinnati Iron & Steel Company and the Bourne-Fuller Company were able to make prompt deliveries of iron and steel material from warehouse stocks.

Skilled labor, in practically all manufacturing lines, is in demand, and in some quarters there is a reported shortage in common labor.

Dean John L. Shearer, of the Ohio Mechanics Institute, announces that a special school for stationary firemen has been inaugurated by that institution. Assisting the school's instructors is Chief City Smoke Inspector A. G. Hall.

The Ideal Concrete Block Company, South Bend, Ind., has plans under way for moving its plant to Cincinnati as soon as the right location can be secured. Additional machinery will be installed, in case the proposed move is made.

The Newport Rolling Mill Company, Newport, Ky., whose plant has been shut down for several days on account of high water, resumed operations January 20.

The Rieck Sheet Metal Company, Dayton, Ohio, has been incorporated with \$25,000 capital stock to make furnaces and operate a general sheet metal shop. Edward A. Rieck and W. W. Gettier are named among the incorporators.

The National Cash Register Company, Dayton, Ohio, has an inquiry out for two 14-in. lathes, a sensitive drill press and a few small tools.

The Excelsior Shoe Company, Portsmouth, Ohio, has tentative plans under way for a large branch factory, for which considerable power transmission and other equipment will be required.

It is reported that the Maxwell Motor Company, the new incorporation that took over the different properties of the United States Motor Company, will soon make some extensive additions to the plant of the Stoddard-Dayton Company's automobile plant at Dayton, Ohio. No particulars are yet available.

The Breece Mfg. Company, Portsmouth, Ohio, is a new incorporation to take over the plants of the Breece Veneer Company, Portsmouth, and the Three States Mfg. Company, Kenova, W. Va. Additions will be made to both plants that will require woodworking and other equipment.

The Tri-State Power and Milling Company, Huntington, W. Va., contemplates the erection of a large hydroelectric power plant. Z. T. Vinson may be addressed for particulars.

James B. Clow & Co., whose head offices are in Chicago, have let contract for a machine shop addition to their cast iron pipe plant at Newcomerstown, Ohio, that will be 50 x 150 ft., one story, and of brick and steel construction.

The Cincinnati Sheet Metal & Roofing Company, 38 Main street, Cincinnati, is in the market for a 10 or 12-ft. regular roofing press, without dies.

Mark Benninghofen, Hamilton, Ohio, has secured a building that will be used for manufacturing gas and gasoline engines.

The Regal Belting Company, Cincinnati, has established a branch factory at 77 East Spring street, Columbus, Ohio, that will be in charge of F. W. Geist. The new factory will be equipped to make belting up to 36 in. in width.

The Central South

LOUISVILLE, KY., January 21, 1913.

Business in this territory has been interfered with somewhat by the flooded condition of the Ohio River and tributaries. Not only has direct loss been suffered by many manufacturing plants located on the banks of these rivers, but there has been a general tieup of business, which has retarded operations in every direction. Nevertheless, a good many sales of machinery

have been reported, and the outlook continues good. Conditions are favorable to a recession of the high water in a short time, and it is believed that normal trade conditions will be restored shortly.

The quarry equipment plant of the New Albany Mfg. Company, New Albany, Ind., across the river from Louisville, resumed operations this week. The machinery subject to damage was raised, and no loss from this source was occasioned. The plant of the Ohio Falls Iron Works, also of New Albany, which has been running full time in the production of bar iron, was also invaded by the flood waters of the Ohio and suspended operations temporarily. It will probably start up again in the immediate future. The Ewalde Iron Company, Louisville, manufacturing bar iron, also had to suspend.

A fire in the finishing department of the bed factory of the Dow Wire & Iron Works, Louisville, did some damage, but no loss of serious consequence was suffered. The department is operating again as usual.

The Falls City Construction Company, Louisville, has the contract for the erection of the plant and the installation of the special machinery of the Speedway Tire Company, recently organized for the manufacture of automobile tires. H. L. Lewman is president of both companies. Most of the special equipment has been contracted for, but power machinery, including boilers and electric motors, is yet to be purchased.

The Falls City Construction Company has been awarded the contract for the erection of a \$50,000 courthouse at Murray, Ky. A steam heating plant, to be installed by the company, is included in the specifications.

The Henry Vogt Machine Company, Louisville, has sold an ice plant of moderate capacity to the Bluegrass Dairy & Ice Company, Lancaster, Ky., just organized with \$10,000 capital stock.

The James Clark, Jr., Electric Company, Louisville, has contracted for the installation of motor equipment aggregating 125 hp. in the plant of the R. S. Hill Company, organized for the manufacture of organs. Much woodworking equipment will be necessary. R. S. Hill is head of the concern, which has located in Highland Park, a Louisville suburb.

The Louisville office of the Westinghouse Electric & Mfg. Company has sold the Mengel Box Company, Louisville, a 100-kw. condenser for installation at its Hickman, Ky., sawmill.

The Louisville office of the Fairbanks-Morse Company reports the sale of lighting equipment to the recently organized Munfordville Electric Light & Power Company, Munfordville, Ky. It consists of a 25-hp. oil engine, dynamo and switchboard.

The Peter & Melcher Steam Stone Works, Louisville, is putting on the market its entire equipment, consisting of boiler, engine, generator, air compressor, stone-working machinery, etc. Decision of members of the company to retire is responsible for the offering.

Owen Tyler, Louisville, has been appointed agent for Kentucky for the Van Dorn Iron Works, Cleveland, in connection with its line of metal lockers.

The Louisville plant of the Barrett Mfg. Company was destroyed by fire last week. The plant was in the flooded district and firemen were unable to fight it efficiently. The loss was about \$2,500.

J. M. Riley, Williamsburg, Ky., who operates a flour mill, is to install a small electric light plant in connection with it. Enlargement a little later on is contemplated. A street lighting system will be installed.

The Industrial Club, Covington, Ky., is considering the erection of a power building for the service of small manufacturers. Joseph Luhn is chairman of the committee in charge.

The Tygart Valley Water Power & Electric Company, Elizabethtown, Ky., has been incorporated with \$20,000 capital stock by D. H. Hall, W. F. Carter, George Snider and others.

Stone & Flora, Mt. Sterling, Ky., have leased a building which is now being erected and will equip it for use as a garage and automobile repair shop.

The city of Paducah, Ky., is considering the establishment of a garbage incinerator. Address Mayor T. N. Hazelip.

Matthew Preston and Adolphus Parsons, Stanford, Ky., are equipping a machine shop for general work and automobile repairing. A lathe has already been purchased, and other machine tools will be needed.

B. J. Treacy, Lexington, Ky., has purchased a site upon which will be erected a large wagon repair shop. Machine tools and woodworking equipment probably will be needed.

The Kentucky Public Service Company, operating electric light and gas plants in a number of Kentucky

cities, has announced elaborate plans for the improvement of its electric light plant at Hopkinsville, Ky. An entirely new plant will be built, and new boilers, engines, dynamos, etc., will be installed. The turbines to be installed will be of considerable capacity, to anticipate the growth of the community. The total cost of the improvements will be \$100,000. The company has other plants at Bowling Green, Frankfort and Owensboro, Ky., and Clarksville, Tenn., and these also are to be similarly improved, it is stated.

The Marstall Furniture Company, Henderson, Ky., is planning the enlargement of its factory and the installation of additional equipment. Herman Marstall is general manager of the company.

The Henderson Builders' Supply Company, Henderson, Ky., is considering the addition of woodworking equipment in its planing mill.

The Converse Bridge Company, Chattanooga, Tenn., has filed articles of incorporation with \$150,000 capital stock. W. H. Converse, F. J. Converse, W. H. Converse, Jr., and others are incorporators. The company has a plant which was established some time ago.

The John P. Dale Machinery Company, Nashville, Tenn., is now handling woodworking equipment, having added a line of wood-turning machinery used in the manufacture of spokes, handles, etc.

McMinnville, Tenn., is considering the installation of new pumping equipment and other machinery at its water works plant, the present apparatus being in poor condition. Recommendations for improvements along this line have been made by fire underwriters following a recent inspection.

The Tennessee Celluloid & Mfg. Company, Memphis, Tenn., has been organized with \$500,000 capital stock for the establishment of a paper mill. It plans to put in machinery for the production of about 20 tons a day. Cottonwood will be used in the manufacture of pulp. James C. Lawrence, Memphis, is the engineer in charge.

The Lookout Boiler & Mfg. Company, Chattanooga, Tenn., has sold a 150-hp. return tubular boiler to the Standard Processing Company, Ridgedale, Tenn., which is now constructing a plant for the handling of cotton goods.

The Nashville Railway & Light Company, Nashville, Tenn., has secured a building permit for the erection of a substation of its power house. The cost of the building will be \$8,000. Equipment will be installed for reducing the voltage of current delivered from the wires of the Tennessee Power Company, which is now building a transmission line from its large water power plant on Caney Fork.

The Eagle Iron Works, Wilmington, N. C., which was recently incorporated to build a rotary engine under the patents of M. M. Parker and J. W. Curtis, has acquired factory premises and is now ready for some of its equipment. It is in the market for a planer, keyseater, pipe cutting and threading machine, steam hammer, lathes, boring mill, boiler and a quantity of small tools.

The Cumberland Motor Company, Pineville, Ky., recently mentioned as having been incorporated with \$50,000 capital stock, has had plans prepared for the erection of a factory building and is now ready to purchase equipment consisting of automatic gear cutting machine, lathes, shaping machines, screw machines, drilling machines and spring coiling machine. It also is in need of a quantity of spring steel wire, round and square, ranging from 3-16 to 1/2 in. in diameter and desires prices of manufacturers.

Birmingham

BIRMINGHAM, ALA., January 20, 1913.

Satisfactory conditions continue to prevail in the machinery trade owing to activity in nearly all classes of factory, mine and construction operations. The horoscope is for a consistent and regular trade for some time to come.

Steadiness is the prevailing characteristic in the mine and sawmill field.

The Ruby Lumber Company, Wautubbee, Miss., has been incorporated with a capital stock of \$20,000 by E. S. Bostick, W. L. Bostick, W. O. Chipman and others, of Meridian, Miss.

W. H. Lyle and associates, of Live Oak, Fla., are interested in establishing a fertilizer mixing plant, utilizing phosphate rock in Suwannee County.

The Piercetown Lumber & Coal Company, Bridgeport, Ala., F. D. Pierce, president, will develop a coal property of 24,000 acres. The present mine capacity is 200 tons. It may install electric machinery. J. D. Austin is engineer in charge.

The Georgia Railway & Power Company, Atlanta, Ga., has awarded contract to complete its dam and power house to the Hardaway Construction Company, Columbus, Ga.

Witaker & Hill will prepare plans for a plant for the Atlanta Auto Top & Trimming Company to cost \$18,000.

The Currie Mfg. Company, Orlando, Fla., has been incorporated with a capital stock of \$100,000 to manufacture lumber. D. W. Currie, president; W. L. Branch, L. W. Crow and W. H. Leonard are interested.

The Sumner Lumber Company, Zuber, Fla., will rebuild its dry kiln recently burned. The L. Moore Dry Kiln Company, Jacksonville, Fla., is the contractor.

The Peoples Ice & Cold Storage Company, Greensboro, N. C., has been organized with a capital stock of \$75,000. E. C. Sykes, Howard Gardner, J. R. Hughes and others are the incorporators.

The Alabama & New Orleans Transportation Company, of New Orleans, La., has plans for a coaling station on the Warrior River, near Tuscaloosa, Ala. A loading plant to cost \$95,000, a coal washer, coal storage, conveyors and elevators will be installed. J. H. Bernard, general manager of Alabama and New Orleans Corporation, New Orleans.

The Alabama Packing Company, Birmingham, has been organized with a capital stock of \$50,000 by Reuben Lewis, George Tarrant and others. It will build a meat packing plant.

Application has been made at Dahlonega, Ga., for the incorporation of the Findley Ridge Mining & Power Company, to engage in the mining and developing of water power for power plant. J. R. Copeland and Charles Sumner, of Birmingham, and E. E. Crisson, of Dahlonega, are interested. The capital stock is \$1,000,000.

The Tampa Packing Company, Tampa, Fla., has applied for a charter to establish an ice and packing plant. The capital stock is \$100,000. H. T. Lykes is president. D. O. Fulton and T. M. Lykes interested.

J. R. Barlow, of the Hibble-Barlow Company, Piedmont, Ala., contemplates establishing a factory for manufacturing rims of vehicle wheels at Gadsden, Ala.

Application has been made at Atlanta, Ga., for the incorporation of the Southern Wheel Company with a capital stock of \$2,500,000, with privilege to increase to \$5,000,000, to manufacture car and other wheels, foundry, etc. Samuel F. Pryor, of St. Louis, and Joseph D. Gallagher, New York. King, Spalding & Underwood, of Atlanta, are the attorneys.

St. Louis

St. Louis, Mo., January 20, 1913.

The machine tool market has not as yet regained the activity prevailing in the later months of 1912, but there are indications of greater interest in factory equipment of various kinds, with the result that dealers are feeling better over the situation, which, however, has at no time appeared discouraging to them. Most of the business continues to be in single tools, but inquiries are coming in in greater numbers.

The British-American Rubber Company, St. Louis, has been organized with \$50,000 capital stock, by Joseph N. Rousseau, Gerard B. Allen, J. H. Gundlach, William H. Schewe, H. Luedinghaus, F. W. Geise, M. H. Grossman and W. H. Geise. It plans to equip a plant at once for the manufacture of rubber goods, including raincoats.

The Pioneer Steel Block Tire Company, St. Louis, with \$25,000 capital stock, has been organized by William D. Becker, J. George Ganahl, Nicholas Le Brun and Fred A. Gerber, to equip a plant for the manufacture of a patented tire for use on automobile trucks.

The W. R. Ball Bearing Fifth Wheel Company, Springfield, Mo., with \$20,000 capital stock, has been incorporated by W. R. Owen, John Nee, R. T. and R. W. Emery, to equip a plant for the manufacture of a patented device for carriages, etc.

The H. G. Sharp Stave Company, New Madrid, Mo., has been incorporated with \$10,000 capital stock by Harry G. Sharp, Roy F. and David G. Sharp to equip a plant for the manufacture of staves.

The Bloomfield Dredging Company, Bloomfield, Mo., with \$50,000 capital stock, has been incorporated by Stephen B. Hunter, Robert Jackson, James A. Reed, William F. Smith and Lynn Stallcup, to equip outfits for contract dredging.

I. J. Wing, 2508 East Twenty-second street, Kansas City, is negotiating for the location of a factory at Springfield, Mo., to manufacture a patented fireproof safe.

The Western Foundry & Sash Weight Co., St. Louis, has awarded a contract for the construction and equipment of an addition to its plant. But little machinery will be required.

The Lawton Machinery & Foundry Company, Lawton, Okla., with \$25,000 capital stock, has been incorporated by B. F. C. Morris and Harry Heiyle, of Oklahoma City, Okla., and J. W. Miner, of Lawton, and will equip a plant at once, it is reported.

The city of DeQueen, Ark., has plans for the construction of a water works plant under the direction of L. G. Ferrell, city engineer.

It is stated that C. P. Chenault, at Tulsa, Okla., has plans for the development of a hydroelectric plant of 42,000 hp. capacity, involving a total investment of about \$500,000. The plants are to supply Tulsa, Oklahoma City, Muskogee, Vinita and other points.

The Tulsa Spring Wheel Company, Tulsa, Okla., with \$50,000 capital stock, has been incorporated by J. B. Dix Dunlap, Peter R. Deickman and W. T. Smith to equip a plant for the manufacture of a specialty wheel.

The Paul Oil & Gas Company, Bartlesville, Okla., recently incorporated with \$25,000 capital stock by C. J. Buey and others, is preparing to develop its property and is reported in the market for machinery.

The plant and franchise of the Stigler Electric & Ice Company, Stigler, Okla., was sold the past week at sheriff's sale to J. N. Ward of Fort Smith, Ark., who controls plants at Fort Smith and Rogers, Ark. It is stated that improvements are contemplated.

The Colonial Oil & Gas Company, Holdenville, Okla., with \$25,000 capital stock, has been incorporated by J. R. Witty, C. M. Hamilton and J. L. Bruce to develop oil property controlled by them.

The United Fruit Company, New Orleans, La., has plans for the building and equipment of a large pre-cooling plant at a total cost for buildings and machinery of about \$200,000. The work is in the hands of Crawford H. Ellis, the manager.

The Texas Hardwood Lumber Company, Warren, Ark., is overhauling its plant and installing new equipment needed for the extension of its business. Samuel Beck and M. B. Entler are interested.

A branch of the Long-Bell Lumber Company, to be known as the Arkansas Short Leaf Lumber Company, is reported to have plans for the construction of a large plant at Pine Bluff, Ark., for the sawing of hardwood lumber.

A brick plant is contemplated at Carthage, Mo., by J. E. Mecusker, of Sedalia, Mo., and C. S. Bahney, of Fort Scott, Kan.

The American Foundry & Machine Company, Salt Lake City, Utah, has filed a petition for a charter with a capital stock of \$10,000. The officers of the company are Francis Mellor, president; Frank A. Robinson, secretary; Joseph R. Riddle, treasurer.

The construction of an electric light plant will be voted on February 18 by the city of Napoleonville, La.

A municipal electric light plant is to be built by the city of Waveland, Miss., the matter being in the hands of the mayor of the city.

A large lumber mill is planned to be constructed at McNary, La., by the McNary Lumber Company, recently incorporated with a capital stock of \$500,000 by W. B. Cady and B. E. Smith, of McNary; H. I. Miller, of New York, and J. S. Reynolds and James G. McNary, of El Paso, Tex. A 28,000-acre tract is to be cut over.

Texas

AUSTIN, TEXAS, January 18, 1913.

An increased demand for irrigation pumping machinery is noted. Never in the history of this section has so much attention been given to this feature of farm development as at present. The irrigation possibilities of western Texas are just beginning to be realized, due to the discovery of an enormous subterranean supply of water which may be obtained in wells of shallow depth and brought to the surface by pumping plants. In this connection it may be mentioned that the Texas Land & Development Company, Plainview, has begun installing the first of its proposed 400 pumping plants on a tract of 60,000 acres of land near that place. Great attention also continues to be given to the development of electrical enterprises in different parts of the State, and the demand for machinery and equipment of this character in the present year promises to exceed that of any preceding year.

The Giddings Cotton Oil Company has purchased at sheriff's sale the electric light plant at Giddings, Texas,

which was owned by H. M. Wolters. The company will enlarge and otherwise improve the plant.

The Armour Packing Company will erect a cold storage plant at Nacogdoches at a cost of \$25,000. It has leased a site for the proposed plant.

The Hoya Lumber Company, Nacogdoches, has been organized and will erect a lumber mill at Hoya Switch. The plant will have a capacity of 25,000 ft. daily.

The Caldwell Cotton Seed Oil Company, Caldwell, has increased its capital stock from \$20,000 to \$40,000. It will make improvements to its oil plant.

James W. Guynes will install a six-ton ice plant at Franklin.

The Commissioners' Court of Galveston County has adopted a resolution requesting the Legislature to submit to a vote of the people a proposed constitutional amendment which will permit the organization of what is to be known as the Seawall Improvement District in that county, and the issuing of \$5,000,000 of bonds for extending the reinforced concrete seawall so as to afford additional protection to the people and property of the district which is to be created.

The Gulf Bag & Paper Company has been organized at Houston with a capital stock of \$50,000, and will install a paper bag manufacturing plant.

John Wiseman and associates will install a cotton seed oil mill and cotton gin at Coughran. A site for the proposed industries has been acquired.

The St. Joe Creamery Company has been organized at Bryan with a capital stock of \$30,000 for the purpose of building a creamery. The incorporators are P. H. Hensarling, W. J. Coulter and G. B. Hensarling.

The Rio Grande Irrigation Company will construct a large system of irrigation near Eagle Pass and install a pumping plant. The incorporators are L. C. de Bona, B. C. de Bona, J. L. Matthews and others.

The Dew Brothers Company, De Walt, has been organized, with headquarters at De Walt, for the purpose of erecting a sugar mill.

The municipal waterworks system of Terrell is being extended and otherwise improved. About 5000 ft. of new mains will be laid.

The local electric light plant of Eastland, owned by A. A. Abney, which was recently destroyed by fire, will be immediately rebuilt.

The Lantry-Shark Rock quarries situated near Belton will soon be reopened. Improved equipment will be installed and employment given to about 125 men.

The City Commission of Fort Worth has under consideration the proposition of issuing \$261,000 of additional bonds for the completion of the West Fork reservoir, which will greatly augment the municipal water supply.

The City Council of San Luis Potosi, Mexico, has under consideration the proposition of installing a municipal electric light and power plant. The city's contract with the Central Mexican Light & Power Company has expired and it is reported it will not be renewed.

The Pacific Coast

SAN FRANCISCO, CAL., January 14, 1913.

The year has started well, the volume of sales being rather larger than usual for the beginning of January, while the number of inquiries gives promise of a very active season. The Southern Pacific Railroad is again coming into the market for a considerable amount of equipment, and has already placed orders for a Shaw electric crane and several heavy tools. No other large business has been closed, but plans are under way for a number of important installations, orders for which will probably be scattered through the next six months, while the aggregate of small inquiries is exceptionally large.

The general machinery market shows increasing activity, though in southern California business in all lines has been somewhat interrupted by the heavy frost damage to the citrus fruit crop. The loss is still very uncertain, but will affect several industries, including box factories in northern California. Numerous orders are coming out for construction machinery, and there is a strong buying movement among mining and smelting interests in Nevada and Arizona. The annual repairs to cement and other building material plants involve the installation of considerable new machinery, and some new plants are to be installed during the year. The inquiry for irrigating equipment is increasing, and a notable development is expected shortly in the line of internal-combustion engines.

A special meeting of stockholders of the George E.

Dow Pumping Engine Company has been called for January 17 to consider the action of the directors in selling the business. A new concern, the Dow Pump & Diesel Engine Company, with headquarters in the Lachman Building, has been formed to take over this company and that of the Dow-Willans Diesel Engine Company. No change in management has been announced.

Two submarine torpedo boats for the navy are to be built at the Craig shipyard, Long Beach, Cal.

Gorrill Brothers, Oakland, Cal., have ordered a lot of Koppel dump cars and portable track for work on the exposition grounds, this being the fourth lot of Koppel cars supplied for the exposition work.

Extensive repairs and improvements are to be made in the Diamond Match Company's sawmill, Stirling City, Cal.

The Bean Spray Pump Company, San José, Cal., recently issued \$175,000 bonds for the enlargement of its plant, manufacturing a line of patent centrifugal pumps.

The Independent Ice & Cold Storage Company, Pasadena, Cal., has placed orders for a large lot of ice machinery to be installed in the spring.

The S. R. Bowen Company, Coalinga, Cal., is preparing to increase its machine shop, and has had plans drawn for the necessary building.

The contract has been let for metal and woodworking shops for the new Oakland manual training high school. Most of the equipment required is already on hand.

The Crocker-Wheeler Company is installing a large shop at Sacramento, Cal., and has already put in a crane, punches, etc.

The Tuolumne Lumber Company is preparing to install a planing mill at Escalon, Cal.

The Buchanan Lumber Company plans to build a planing mill, wharf, etc., at San Diego, Cal.

The Pan-American Marble Company has purchased a site for a marble finishing plant at Los Angeles.

The Moonlight mine, near Redding, Cal., is installing electric power.

The Mesa (Ariz.) Cotton Growers' Association is considering the installation of a large ginning and oil plant.

The Copper Queen Smelting Company, Douglas, Ariz., is preparing to add several new furnaces and roasters, and is laying foundations for a new hoist, compressors and boilers.

Cochise County, Ariz., is figuring on the purchase of road building machinery amounting to about \$6,000.

The E. B. & A. L. Stone Company, this city, will probably place orders in a few days for a lot of crushing, washing and gravel handling machinery.

Eastern Canada

TORONTO, ONT., January 18, 1913.

Weather conditions continue to give special character to trade. Because of the unprecedented mildness of the winter the operations of factories have been uninterrupted at the high tension point, whereas usually at this season the inclemency of the weather and the hindrances to transportation cause comparative stagnation. Undoubtedly the home production of manufactured articles is made more nearly sufficient for the home demand as a consequence of the favorable winter weather, and the margin to be filled in by imports is much smaller than it would be if the winter were severe. The home production of manufactured goods appears unable to keep pace with home demand in many lines, no matter how favorable conditions are for a large output. The arrival of immigrants to the number of nearly 400,000 last year—which is about 5 per cent. of the country's population—contributes very materially to the demand calculated upon, especially as the immigrant adults are usually people of financial resources and are spenders from the time they settle down.

The Royal Motor Car Company, London, Ont., recently organized with a capital stock of \$500,000, has concluded to erect its factory in Strathroy, Ont., this decision having been arrived at following negotiations with the Strathroy Council. The town makes a loan of \$50,000, gives a free site and other inducements. It is the intention of the firm to start work as soon as possible on a factory 200 x 400 ft., two stories. J. G. Dunn, of Strathroy, who is associated with the Canadian Cannery, has been elected president.

The plans are now being made for a two-story factory covering 42,000 sq. ft., for the Tate Electric, Ltd., a motor car company organized by Toronto and Montreal capitalists, to build electric pleasure and commer-

cial case. The directors are Henry and N. A. Timmins, W. Scott Hutchinson, C. E. Archibold and S. Carsley, of Montreal; D. A. Dunlap and A. O. Tate, of Toronto, and Albert Kaltschmire, of Detroit, factory and production manager. The site of the factory will be on St. Louis road, adjoining the site of the Fisher Body Company. The building is to be constructed of steel and brick. The general offices will be at Walkerville, with executive offices in Montreal.

Among the new industries established in Ottawa, Ont., and the vicinity during the past year are: Aluminium Castings, Ltd., corner Parkdale avenue and G. T. R. tracks; Bishopric Wallboard Company, Ltd., Hillcrest, Ottawa South; Beaver Company, Ltd., Beaverdale, Aylmer road; Capital Wire Cloth & Mfg. Company, Armstrong and Hamilton avenues; Campbell Steel & Iron Works, Ltd., corner Carling avenue and Canadian Pacific Railway tracks; Canada Floors, Ltd., corner Champagne and Wellington streets; Davidson & Crooks foundry, Hamilton avenue; Dominion Printing & Loose Leaf Company, 95 George street; Dominion Bridge Company, Ltd., at Eastview; Greater Ottawa Sash & Door Company, Parkdale avenue; Modern Electric & Mfg. Company, 436 Wellington street; Ottawa Cut Glass Company, Ltd., corner Wellington and Parkdale avenue.

Haley Bros. & Co., St. John, N. B., have applied to the City Council for a site upon which to erect a much larger woodworking plant than that they are now operating.

The McClary Mfg. Company, London, Ont., will erect a six-story warehouse in St. John, N. B.

The Petrie Mfg. Company, Hamilton, Ont., maker of dairy supplies, will put up an eight-story warehouse in St. John, N. B.

The Edward Partington Pulp & Paper Company, St. John, N. B., will increase the capacity of its pulp mill 50 per cent.

The British contracting firm of Griffiths & Co. has been incorporated under letters patent issued by the Secretary of State, Canada. The capital stock of the company is placed at \$2,500,000. The notice of incorporation sets forth the objects of the company to be, among others, the carrying on of the business of a general contracting, construction and development company, and of electrical, civil and hydraulic and harbor engineers. The chief place of business of the company is to be in Montreal.

The Joliette Steel Casting Works has been incorporated with a capital stock of \$2,000,000. The incorporators are George A. Delisle, manufacturer; John Lawrence McDonald, contractor; A. Carle, accountant, and John B. Duclos, all of the town of Joliette, Que.

The first new industry in Berlin, Ont., for 1913 has been started by S. A. Brubacher of that city, who will manufacture motor washing machines. A good-sized building has been erected on Queen street North.

The New Brunswick Hydroelectric Company, St. John, N. B., will, during the year, make a large expenditure in connection with its project to provide another source of light, heat and power.

T. McAvity & Sons, St. John, N. B., are prepared to erect a group of 30 buildings and give employment to a thousand workers in the iron and brass industries when the city has its new industrial area ready for locating upon.

To Cowans, Ltd., Toronto, has been granted a permit to build a four-story concrete factory on Sterling road, near Dundas street, to cost \$89,700.

J. C. MacGregor, president, announces that the Eastern Car Company's plant will be in operation July 1, 1913. The company will employ 1000 men and have a daily output of 25 cars. Mr. MacGregor is also secretary of the board, R. E. Harris vice-president, and the directors are Thomas Cantley, Hon. J. D. MacGregor, G. F. MacKay and R. E. Chambers.

The Consumers' Gas Company, Toronto, is erecting a two-story brick purifying house on Eastern avenue at a cost of \$52,000.

Hinde & Dauch Paper Company, Toronto, is putting up a four-story brick and steel factory building on Hannah avenue, near King street, to cost \$80,000.

A company has been formed at the head of which is Hon. George A. Clare, M. P., of Preston, Ont., and other Waterloo, also Toronto capitalists, to manufacture galvanized iron and steel household wares at Hespeler, Ont. The new factory will use the old woolen mills buildings, which ten years ago ceased operations on account of an unfavorable tariff.

It is rumored that a branch of the Chicago Bridge & Iron Works may be located in Hamilton, Ont., as its agents were looking for a 20-acre site.

In connection with the big scheme for the enlarge-

ment of the harbor of St. John, N. B., it is stated that Cammell, Laird & Co. have decided to lay down a plant for the construction of the largest war and merchant ships. Similar facilities are also to be provided by a British syndicate at Sydney, Cape Breton.

The Brantford Cordage Company, Brantford, Ont., had a very serious fire in its works on the night of January 13. The fire broke out in the heavily stocked warehouse, which contained 800 tons of twine, all of which is a total loss. The main part of the factory was not damaged. The loss is estimated at \$100,000. It was announced that the plant would continue in operation and that rebuilding operations would be commenced at once.

The St. Thomas Cold Storage Company, St. Thomas, Ont., has its large plant in that city near completion.

The Canadian Niagara Power Company, Niagara Falls, Ont., has completed plans for the extension of the forebay at its power plant, which will largely increase its capacity. The expense of the work, including a new breakwater of stone, will be about \$1,500,000.

The Guelph Tool Company, T. S. Hobbs manager, has secured a site at London, Ont., upon which it will erect a factory for the manufacture of tools and hardware specialties. Estimated cost, \$50,000.

The Canadian Engines Company, Dunnville, Ont., is having plans drawn for a large addition to be made to its plant for the manufacture of gas and gasoline engines.

Western Canada

WINNIPEG, MAN., January 17, 1913.

The volume of orders is fair for this season, and the prospects continue excellent. Gradually, as the season advances the situation seems to indicate an active spring and summer trade. Leading business and financial men are confident that this year will be another prosperous one in this part of Canada, and that there will be a great amount of industrial expansion. Weather conditions just now prevent much headway.

The Industrial Bureau of Brandon, Man., announces that the Brandon Wire & Stamp Company, organized by Eastern capitalists for the manufacture and distribution of metal goods, is about to start operations.

It is announced that the American Can Company is preparing to establish a branch factory in Vancouver, B. C. P. F. Kendall, vice-president, Portland, Ore., has been in Vancouver arranging for a suitable site.

It is expected that the Government of Alberta will arrange in the near future to guarantee the bonds of the Grain Growers' Grain Company, Winnipeg, to the extent of about \$1,000,000, the company to erect at least 50 grain elevators in Alberta this year.

The Western Canadian Brush Mfg. Company has arranged for a factory site in Moose Jaw, Sask.

The packing and cold storage plant of P. Burns & Co., Ltd., Calgary, Alberta, burned this week, with a loss estimated at \$1,000,000. The company will at once start rebuilding.

Carter, Halls & Aldinger, Winnipeg, have been awarded the contract for the erection of a six-story warehouse at Regina, Sask., for the John Deere Plow Company. The building will be equipped with freight elevators.

As a result of the big fire at the packing plant in Calgary this week, there is a movement on foot there to install a waterworks plant commensurate to the needs of that rapidly growing city.

The plant of the Western Foundry & Machine Company, Ltd., Saskatoon, Sask., was damaged a few days ago by fire to the extent of about \$25,000. The company will start to rebuild at once.

Austin J. Bruff, a representative of the Union Metallic Cartridge Company, Bridgeport, Conn., has announced in Edmonton, Alberta, that his firm will establish a branch factory there.

The Great West Lumber Company, Ltd., Red Deer, Alberta, is preparing to add considerable machinery to its mill at that point. This will include a lathe mill, a resaw and a new boiler.

P. J. Noel has secured a site at Fort Frances, Western Ontario, for a plant to manufacture barrel staves and excelsior.

R. Bruce & Son, Fort Frances, are preparing to make some additions to the firm's tie-cutting plant at that point.

The Western Terminal Elevator Company, Ltd., will increase the capacity of its elevator at Fort William by 1,000,000 bushels.

The building of the Western Foundry & Machine Company, Saskatoon, Sask., was completely gutted by fire January 12. Many valuable patterns were destroyed, and the total loss on plant and buildings will total about \$25,000. The company will rebuild at an early date.

H. E. Lambe, representing H. Marshall Sons & Co., an English engineering firm, has been negotiating with the local authorities at Saskatoon, Sask., concerning the establishment of a plant in that city to manufacture gasoline tractors and stationary engines.

The Moose Jaw Engineering Works, Ltd., and the Metal Specialties, Ltd., have been incorporated at Regina, Sask. E. J. Woodson, of Detroit, is negotiating to establish a plant for the former at Moose Jaw, Sask., and C. L. Ackerson, of Rochester, is negotiating to establish a plant for the Metal Specialties Company, also in Moose Jaw. The engineering company would begin manufacturing operations next January with 150 men, and the other company would have 200 men at work next November. Gas engines, traction engines, cement mixers and pumps, etc., would be made by the engineering company. The Metal Specialties would manufacture drawn and turned brass work, valves, fittings, plumbers' supplies, steamfitters' supplies, heating systems, equipment, etc.

Trade Publications

Blake & Johnson Calendar.—Blake & Johnson Company, Waterbury, Conn. Wall calendar, $17\frac{1}{4} \times 29\frac{1}{4}$ in. Bears a genuine Barbizon print of the original painting in oil by Thomas Moran of the National Academy, entitled "When Venice Ruled the Sea," representing a scene in 1432. It is suggested by the company as an effective and acceptable "bit of color" for some choice spot on the walls of the recipient's home.

Hydraulic Turbines.—Allis-Chalmers Company, Milwaukee, Wis. Bulletin No. 1631. Treats of several types of hydraulic turbines with spiral cast-iron or cast-steel casings, which are made with runners ranging from 14 to 80 in. in diameter. The special features claimed for these turbines are efficiency, reliability, low maintenance and the various arrangements which can be supplied are illustrated.

Roller Bearings.—American Roller Bearing Company, Farmers Bank Building, Pittsburgh, Pa. Folder. Refers to a new type of roller bearing in which all sliding contact has been eliminated and which runs without lubricant. The construction of this bearing is briefly described together with the results of a number of tests. An illustrated description of the bearing appeared in *The Iron Age*, December 12, 1912.

Calendar.—Brown Instrument Company, Philadelphia, Pa. Calls attention to the use of the company's pyrometers for indicating stack temperatures on warships. One of the features of the calendar is the photograph of the U. S. S. Wyoming, the largest warship in the world, where these instruments were used.

Deep Well Pumps.—Deane Steam Pump Company, 115 Broadway, New York City. Bulletin No. D-225. Illustrates a new departure in the construction of triple-plunger artesian well pumps. The construction and operation of the pump is described at some length and tables of specifications for the different sizes built are included.

Priming Cup.—Hagstrom Bros. Mfg. Co., Lindsborg, Kan. Mailing card. Concerned with a suction priming cup for use with internal combustion engines. The advantages claimed for the device are instantaneous starting of the engine in cold weather and the mixing of fuel the same as in a carburetor.

Heat Treating Furnaces.—Gilbert & Barker Mfg. Co., Springfield, Mass. Catalogue B. Lists a number of types of gas fired heat treating furnaces. All of the furnaces are illustrated and there is a brief description of each with condensed specification tables on the facing pages. Three of the furnaces were illustrated in *The Iron Age*, December 12, 1912.

Milling Machine.—Harrington Machine Company, Erie, Pa. Circular. Concerned with a special type of milling machine which is particularly adapted for milling irregular dies for trimming drop forgings or other open work. The machine is of the under type, and for this reason the cutter does not obstruct the view of the operator. The construction of the machine is briefly described, and there are several views of the machine itself.

Rolled Gears.—Anderson Rolled Gear Company, Berea road and L. S. & M. S. Railroad, Cleveland, Ohio. Booklet C. Refers to a process of manufacturing spur, herringbone, helical and bevel gears, sprockets and worm gear rings by rolling. The special advantages claimed for this method are strength, accuracy, economy and durability. An illustrated description of the machine employed in the production of these gears appeared in *The Iron Age*, November 3, 1910.

Metals.—A. Allan & Son, 486 Greenwich street, New York City. Folder. Calls attention to three metals made by this company which are a bronze for mill pinion, locomotive, steam and gas engine bear-

ings, metal valve disks for superheated steam service and Red Metal which is designed to be used on pistons. The special features of these three metals are briefly touched upon and a list of the various sizes in which the disks can be furnished is included.

Lathes.—South Bend Machine Tool Company, South Bend, Ind. Catalogue No. 43. Gives general description and specifications for a line of screw cutting lathes with regular and gap beds. All of these are illustrated and following a description of the tools themselves, various special features are shown and briefly described. The lathes include an 18-in. screw cutting lathe and a 16-in. gap bed lathe, which were illustrated in *The Iron Age*, December 12, 1912, and a motor-driven lathe with a double belt reversible drive, an illustrated description of which appeared in *The Iron Age*, March 28, 1912.

Electric Forge Blowers.—Emerson Electric Mfg. Company, St. Louis, Mo. Bulletin No. 3313, replacing No. 3311. Illustrates and describes a line of direct-connected electric forge blowers for use on direct and alternating current circuits. Among the blowers listed is one for operating two forges. Brief specification tables of the various types of blowers are included.

Steel Posts.—Carbo Steel Post Company, Chicago Heights, Ill. Booklet. Describes the construction of a steel post which possesses the feature of being very elastic. These posts are used for a number of different purposes and the various styles are illustrated.

Mandrel Presses.—G. T. Eames Company, Kalamazoo, Mich. 10-page illustrated booklet. Presents specifications of five sizes of mandrel presses for handling work from 15 in. to 36 in. in diameter. The special feature of the design of these presses is the providing of both a simple and compound leverage arrangement, which is instantly interchangeable and possesses a sufficient strength to withstand the heaviest pressures. The larger presses for work requiring great centering capacity are fitted with pivoted swinging tables hinged rigidly to prevent springing but possessing the added advantage that they may be swung aside for long work. An illustrated description of one of these presses appeared in *The Iron Age*, February 8, 1912.

Milling Machines.—Carter & Hakes Machine Company, Winsted, Conn. Catalogue No. 2. This is the company's 1913 catalogue describing and illustrating a line of floor, bench and hand milling machines, together with the various types of centers and vises which can be furnished for use with the machines. Condensed tables of specifications for all of the machines are included.

Cold Metal Sawing Machinery.—Vulcan Engineering Company, Fisher Building, Chicago, Ill. Set of five bulletins. Illustrates the several styles and sizes of cold metal sawing machinery built by the Q. M. S. Company, for which it acts as sales agent. The various machines range in capacity from a small machine for light material up to an exceptionally heavy one for foundry use. Among the machines covered is a combination sawing and rotary planing machine which was illustrated in *The Iron Age*, October 31, 1912.

Steel Fence Posts.—Inland Steel Company, First National Bank Building, Chicago, Ill. Pamphlet. Relates to a number of different styles of posts which are made from steel angles. The various uses of the several types of posts, all of which are illustrated, are touched upon together with their advantages. Mention is also made of a mold for the concrete base designed to be used with these posts as well as the ornamental tops. Some general information on the erection of the posts is also included.

Firebrick Cement.—Smooth-On Mfg. Co., 572 Communipaw avenue, Jersey City, N. J. Folder. Deals with the Smooth-On No. 8 firebrick cement for setting and coating firebrick. This cement is designed to be used in connection with boiler repairs where the company's iron cement has been used for repairing the plates of the shell. The special features of the cement are briefly mentioned, together with directions for its use.

Mining Supplies.—American Safety Lamp & Mine Supply Company, Scranton, Pa. Three leaflets and a set of loose-leaf bulletins. Relate to a number of different types of mining appliances which include fusible plugs, a pneumatic signal attachment for speaking tubes, safety lamps of the various types and an automatic trip alarm. All of the devices are illustrated and briefly described.

Tilting Crucible Melting Furnaces.—W. S. Rockwell Company, 50 Church street, New York City. Bulletin No. 41. Treats of a line of single and double chamber tilting crucible melting furnaces for aluminum, brass, bronze, copper, gold, silver and other non-ferrous metals. Plan views and sectional elevations of the two types of furnaces are given together with views of installation and tables of specifications of the four sizes.

The C. O. Bartlett & Snow Company, Cleveland, Ohio, reports the following orders: Coal retarding conveyor for the Clinchfield Coal Corporation, Slemp, W. Va.; coke pusher, leveler and conveyor for the Atlantic Crushed Coke Company, Derry, Pa.; sand crushing and drying plant for the Warren Silica Company, Torpedo, Pa.; coal crushing and handling equipment for the Lackawanna Steel Company; coal crushing and handling equipment for the Anchor Coal Company, High Coal, W. Va.; car haul for the Progress Coal Company, Gannock, Ohio.

